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SUMMARY OF RECENT ABSTRACTS *

VII. HELMINTHIASIS †

TREMATODES

Schistosomiasis

General

Notes on the human infection in Indonesia with cestodes, trematodes and nematodes commonly found in animals, are given by LIE KIAN JOE and his colleagues (pp. 167, 168).

MALDONADO *et al.* (p. 549) compared a number of techniques for examination of faeces for helminth infections. Results varied according to the worms concerned, and are given in detail in the original abstract, but the investigation emphasized the all-round importance of the simple smear method and the value of formalin-Triton-ether among the concentration methods.

Four methods for testing anthelmintics *in vitro* are described by MACKIE and PARNELL (p. 985).

ELIAKIM and DAVIES (pp. 170, 790) give information on the large numbers of immigrants into Israel who are infected with schistosomes, and comment on the danger that the local potential snail hosts may become infected.

In Mozambique urinary schistosomiasis is uniformly spread in Africans, but *Schistosoma mansoni*, though common, is more patchily distributed. DE AZEVEDO *et al.* (p. 792) were not able to detect serious blood changes in *S. haematobium* infections in spite of the haematuria, which is sometimes intense. One probable case of human infection with *S. bovis* was found. They discuss the snail hosts.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1955, v. 52. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

In a survey of Africans in the European farming areas of the Transvaal Annecke *et al.* (p. 790) found infection with *S. mansoni* in 68 per cent. and with *S. haematobium* in 66 per cent. in farms not offering any protection against the infections. In those with better water supply—closed canals and pumped water—the rates were 29 and 49 per cent. In the African areas *S. haematobium* rates were high but *S. mansoni* comparatively moderate. For the European areas they suggest vector control, sanitary measures and mass treatment, but the African areas present a much more difficult problem. Annecke (p. 1200), commenting on the higher rates of *S. mansoni* on farms than in the reserves (especially in children), mentions the dangers associated with the rapid development of irrigation.

Hubendick (p. 276) discusses the difficult subject of discrimination of species in medically important snails. The original should be read in full for details, but note may be made of one point, namely that for the original demarcation of a species reliable methods should be used even if they are not convenient to apply, but that the routine identification of already defined species should be based on distinguishing characteristics which are readily recognizable. The Study Group of WHO (p. 656) has issued a report on the identification of snail hosts of schistosomes in Equatorial and South Africa which presents a satisfactory and presumably final revision of classification from the level of family (Planorbidae) down to that of subgenera. All the species known as intermediate hosts of *S. mansoni* in Africa are of the same genus, *Biomphalaria*, which is defined, and all the species known as intermediate hosts of *S. haematobium* in Africa are of the same genus, *Bulinus*, which is defined. Diagnostic lists are given for 15 species of *Biomphalaria* and 4 of *Bulinus* (subgenus *Physopsis*). Techniques of collection, labelling and preservation are described.

Mozley (p. 417) has written a small book on distribution and population studies of fresh-water molluscs.

An account of the fresh-water snails of medical importance in the coastal area of Kenya is given by Teesdale (p. 377), who also reports some successful attempts at control by the use of a preparation of the root of a local plant, which kills the snails.

Cridland (p. 797) has tested the susceptibility of African snails to *S. haematobium* and *S. mansoni*. He gives details of the susceptible and insusceptible species.

In experimental work in the Gold Coast Edwards and McCullough (p. 1102) found that at 27°C. *S. haematobium* in *Bulinus africanus* produced cercariae in about 32 days after infection, and *S. mansoni* in *B. pfeifferi* in about 27 days. An infected baboon produced eggs of *S. haematobium* in both urine and faeces by the 75th day.

Lewert and Lee (p. 374) report extensive histochemical studies of the extracellular changes caused by helminth larvae penetrating host tissues, and of the enzyme activity of larvae *in vitro* and *in vivo*. The mechanism

of penetration in parasites which cause changes in the basement membrane and ground substance of the host skin is related to the production of a collagenase-like enzyme.

Litalien and Deschiens (p. 660) show that nitrates and nitrites in water upset the ecology of snail hosts of schistosomes, and at a strength of 1 gm. per litre are fatal to *Australorbis glabratus* and *B. contortus* in 1–6 days. Deschiens *et al.* (p. 908) also investigated the tolerance of *A. glabratus* and *B. contortus* for salts and gases in water. The crustacean *Cypridopsis hartwigi* is able to attack and damage the soft parts of *Planorbis*, *Bulinus* and *Physopsis*. The snails withdraw completely into their shells and die of starvation, but Deschiens (p. 379) recognizes that under natural conditions where other aquatic animals are present and large volumes of water are concerned, the effectiveness of the crustaceans would be much reduced.

Newsome and Robinson (p. 1102) describe a technique which enables them to maintain schistosomes alive *in vitro* for prolonged studies; the description should be read in full.

An examination of the value of different extracts of *S. mansoni* as antigen for complement-fixation tests for the diagnosis of schistosomiasis has been made by Eliakim and Davies (pp. 171, 994), who recommend an extract in Coca's solution. Extracts of *Fasciola hepatica* were insufficient for this purpose. The same authors (p. 172) found that skin tests with a saline extract of *S. mansoni* were fairly satisfactory, and that when complement-fixation and skin tests were performed together, positive results were always obtained with one or both tests. They conclude that an antigen prepared from an aqueous extract of adult *S. mansoni* is effective for both tests, and that these tests are more efficacious than the usual biopsy and egg-recovery techniques. Antigens used in complement-fixation tests for schistosomiasis tend to react with syphilitic sera unless first treated with organic solvents, and Chaffee *et al.* (p. 173) show that although an antigen prepared by saline extraction of untreated adult *S. mansoni* was as sensitive (95–96 per cent.) as one prepared by saline extraction of ether-treated *S. mansoni*, the former gave a few false positive reactions with syphilitic sera whereas the latter did not.

Schistosome eggs lodge for long periods in the tissues of the host, and may therefore act as sources of antigen leading to the formation of antibodies differing from those developing against cercariae and adult worms. Oliver-González (p. 55) has now detected such antibodies as revealed by the formation of a precipitate *in vitro* round eggs of *S. mansoni* when these are incubated in sera of infected persons or animals, but not of uninfected persons. In comment Gordon remarks that if this work is confirmed it may at last provide a reliable laboratory test for the recognition of infection. Oliver-González *et al.* (p. 985) later report that when eggs of *S. haematobium* and *S. japonicum* are used the reaction is species-specific, but that with *S. mansoni* eggs there is minor cross-reaction in antisera to the other two species. No cross-reactions could

be found with sera from patients with paragonimiasis or *F. hepatica* infection.

The katayama syndrome was originally associated with *S. japonicum* infection, but WALT (p. 1202) now describes it in Africa, associated with *S. haematobium* or *S. mansoni*, and remarks that it is becoming more common as *S. mansoni* is more often found. The symptoms indicate severe illness, and may include fever, abdominal pain, urticaria, cough, enlargement of liver or spleen, and eosinophilia.

Radiological studies of the portal system, liver and spleen in schistosomiasis are reported by RAGHEB *et al.* (p. 1201); details are given in the original abstract.

Lobeline stimulates the respiratory centre by its action on the chemoreceptor of the carotid body and has been used to estimate systemic circulation time after injection into the spleen. BIBAWI *et al.* (p. 552) found that in schistosomal hepatic fibrosis the circulation time was normal in 24 of 40 cases, and either reduced or increased in the remainder. In those patients in whom it was normal, percutaneous splenic venography showed well developed collateral circulation.

Schistosomal granulomata, usually in the perianal and genital regions, are described by EL-ZAWAHRY (p. 1203), who discusses differential diagnosis from carcinoma, cutaneous amoebiasis, syphilis and other conditions, and reports that treatment with tartar emetic or Fuadin was usually successful in his series of 10 cases, but that surgical intervention was required in 2.

DEJOU and NAVARRANNE (p. 995) discuss the surgical aspects of schistosomiasis, particularly in relation to the genito-urinary apparatus, but also to the other abdominal organs. The account should be read in full.

CLEVE *et al.* (p. 460) report 3 cases of severe toxic reactions to tartar emetic—involving especially the myocardium—in patients treated for schistosomiasis. They point out that the therapeutic dose is very close to the toxic dose, especially in persons weighing under 150 pounds, and that the drug should be given with caution.

KING (p. 553) has conducted a careful trial of Nilodin (lucanthone hydrochloride), giving 20 mgm. per kgm. daily, divided into 3 doses, for 12 days. In urinary schistosomiasis a cure rate of 60 per cent. was found with a follow-up period of 6 months; in the few rectal cases the clinical results were good. The author thinks the treatment useful, but the course should last 12, or better 16, days. Shorter courses, even with higher dosage, are less successful.

HALAWANI *et al.* (p. 907) used Miracil D (lucanthone) in dosages of 400–600 mgm. daily for 18–20 days for patients weighing 60 kgm.; they regard it as effective, recording cure in 80 per cent. of *S. haematobium* infections, and in all of 6 patients with *S. mansoni*. MUSTAFA *et al.* (p. 988) in Cairo gave Miracil D in doses of 16–24 mgm. per kgm. daily for 7 days in children with *S. haematobium* infection; 48 out of 50 were cured and 6 of them who also had *S. mansoni* were also cured. The

criterion of cure was the absence of eggs on examination of urine or faeces at intervals for 6 months.

FRIEDHEIM (p. 461) discusses the general principles of chemotherapy in relation to the newer drugs, and gives a description of MSb (a polymerized form of melaminylphenylstibonic acid which has shown prolonged prophylactic effects in experimental trypanosomiasis and filariasis), and TWSb (antimony-a,a′-dimercapto-potassium succinate), which resembles antimony tartrate but is much less toxic. It has proved effective in *S. mansoni* infections (FRIEDHEIM *et al.*, p. 56). LUTTERMOSER (p. 177) has devised a method for testing the activity of drugs against *S. mansoni* infections of mice, and comparing this with the activity of Fuadin. Certain substances were tested, including TWSb-K, which was found equivalent to Fuadin as regards survival time, but did not produce as many dead worms in the liver as Fuadin.

The therapeutic action of symmetrical diaminodiphenoxyalkanes in experimental *S. mansoni* and *S. japonicum* infections has been investigated by RAISON and STANDEN (p. 997). There is a toxic action on the eyes.

A method for estimating the concentration of copper sulphate in water is described by CLARKE and GOODLIFFE (p. 909).

Temperature is one of the most important enviromental factors determining the efficiency of molluscicides, and HOFFMAN and ZAKHARY (p. 659) observed that in Egypt the monthly average water temperature in canals may show a seasonal variation of 18°C. instead of 12°C. as previously estimated. They suggest that molluscicides should be applied during the hot summer months, when they will be most efficient. In the laboratory MAGALHÃES NETO *et al.* (p. 175) have shown that mud rapidly reduces the concentration of copper sulphate in water, and also that, although alkaline water precipitates copper sulphate, the addition of tartaric acid does not help since this acid itself strongly inhibits the action of copper sulphate. VELOSO (p. 175) points out that copper sulphate is quickly precipitated by organic matter, and that its action is aided by agitation of the water into which it is introduced. He has devised a method by which the water is agitated when the solution is distributed from a high-pressure pump, with good results.

In snails collected near Durban, South Africa, BAYER (p. 57) found a large variety of larval trematodes. These tend to reduce the length of life of the affected snails, and he suggests that they should be encouraged by preservation of the waterfowl which are the definitive hosts, as a measure of snail control for the prevention of human schistosomiasis.

Several species of crayfish have been shown to be predatory on the snail hosts of *S. haematobium* and *S. mansoni*; DESCHIENS and LAMY (p. 909) suggest that they, and crabs, may be useful in snail control.

Schistosoma haematobium infections

An outbreak of *S. haematobium* infection contracted in swimming pools of a settlement in the Jordan valley is reported by DAVIES (p. 1199), who

thinks that new immigrants from Iraq and Iran probably introduced the infection.

In Iraq WATSON (p. 275) has made studies which indicate that urinary schistosomiasis is a social rather than an occupational disease. High rates are associated with poverty and poor housing in proximity to infected waters, rather than to any particular occupation.

A survey of schoolchildren in Sukumaland, Tanganyika, showed urinary schistosomiasis in almost 100 per cent. USBORNE (p. 278) notes that the severity of the clinical manifestations bore no relationship to the standard of scholastic work, and that the older children had fewer symptoms and less haematuria than the younger, indicating the development of tolerance to the infection at about the age of puberty.

A study of *Planorbis metidjensis* in Portugal led DE AZEVEDO and his colleagues (pp. 377, 789) to the conclusion that it does not differ from *P. corneus*. It is not susceptible to *S. mansoni*, but it is susceptible to *S. haematobium*, a strain from Portuguese Guinea being used.

ZAKARIA (p. 276) has studied the bionomics of *Bulinus truncatus* in an irrigation canal in Iraq; the distribution appears to be more related to shade and natural food supply—and perhaps to the physical nature of the substratum—than to human and animal pollution. *Bulinus forskali* is a host of *S. haematobium* in Mauritius, and is found in Egypt. EL-GINDY (p. 1205) has collected specimens in Egypt naturally infected with schistosomes which may have been *S. haematobium*, though proof was not complete.

For *S. haematobium* infection in Gambia DUKE and MCCULLOUGH (p. 169) show that the distribution is determined by local topography, transmission occurring only where there is a suitable host in a relatively compact body of water visited frequently by the inhabitants. In places near the permanent freshwater reaches of the river the incidence is 12–14 per cent.; in places set back from the river the child rate reaches 72 per cent. and infection probably arises from the much used small ponds. In areas of high incidence a state of equilibrium seems to be reached in which every child becomes infected by the age of 15, and shows mild symptoms, locally regarded as unimportant. None of the potential snail hosts of *S. haematobium* or *S. mansoni* was found by the same authors (p. 169) in the Gambia River itself, because of salinity and other local conditions; they inhabited marshy areas, and the suggestion is made that the increasing cultivation of rice will probably extend their distribution.

Although in part of the Gold Coast the snail *B. africanus* is widespread, MCCULLOUGH (p. 905) finds that the incidence of *S. haematobium* infection in children is low, probably because the snails are mainly to be found in sparsely populated localities. *B. forskali* appears not to be an effective vector there.

MOORE and MELENEY (p. 376) attempted to infect albino mice, Syrian hamsters, albino rats, guineapigs and rabbits with *S. haematobium*, but

only the mice and hamsters were susceptible. They give an account of the course of the infection in these animals. KUNTZ and MALAKATIS (p. 799) in Egypt similarly found that albino mice and hamsters were susceptible, and also monkeys and baboons.

PELLEGRINO *et al.* (p. 277) write of the value of intravenous pyelography in urinary schistosomiasis.

VAN BEUKERING (p. 793), as a result of experience in the Gold Coast, takes a more serious view than usual of the effects of *S. haematobium* infection.

EL-GHOLMY *et al.* (p. 658) report a comprehensive study of 127 children suffering from urinary schistosomiasis (19 also showed eggs of *S. haematobium* or *S. mansoni* in the faeces). The liver was enlarged in 40 per cent. and the spleen in 27·5; one-quarter had abnormal liver function tests and 26 of 33 on whom biopsy was performed showed evidence of schistosomiasis of the liver. A relationship was observed between the degree of hepatic fibrosis and portal hypertension. Late and severe hepatic complications are more likely to follow *S. mansoni* than *S. haematobium* infections.

In a discussion on peptic ulceration in Southern Nigeria ROSE (p. 407) reports that he has on a number of occasions found granulomatous prepyloric masses which contain eggs of *S. haematobium*.

It is known that carcinoma is a complication of schistosomiasis of the bladder, and various theories have been advanced to account for this. MOHAMED (p. 794) discusses the subject, pointing out the association of this infection with sepsis, the formation of calculi and the formation of squamous cells which tend to become cancerous. MOHAMED (p. 986) also discusses cystic disease of the urinary tract and its relation to schistosomiasis and malignancy, drawing on 300 autopsy records in Cairo. Much detail is given in this long monograph, and the original abstract contains a full summary of the findings and discussion.

Acute cardiac insufficiency, associated with *S. haematobium*, eggs of which were found in the indurated lung at autopsy, is described by PAYET *et al.* (p. 1203) in 2 patients.

RAOULT *et al.* (p. 378) report a new drug—AB 5—which is a hypophosphite of calcium potassium antimony tartrate, and has proved useful in schistosomiasis. BATAILLARD (p. 1204) found that this drug produced some undesirable side-effects on injection, and that although the immediate results in *S. haematobium* infection were good, the long-term results were less satisfactory, a view shared by SCHNEIDER.

Schistosoma mansoni infections

Glycolysis appears to be more necessary than respiration for the survival of *S. mansoni*, and experiments by MANSOUR and BUEDING (p. 380) indicate that the trivalent antimonials cause marked inhibition of glycolysis in a glucose substrate. They investigated the enzyme systems possibly concerned. A study of the immunological specificity

of lactic dehydrogenase of *S. mansoni* is reported by Henion *et al.* (p. 551).

Luttermoser (p. 991) has studied the effect of light on the emergence of cercariae of *S. mansoni* from infected *A. glabratus*, and shows that by using artificial light from 3 to 9 a.m. after a period of darkness, a constant and heavy supply of cercariae can be obtained for experimental work.

El-Gindy (p. 906) in Egypt shows that the proportion of *Biomphalaria boissyi* infected with *S. mansoni* rises in spring after man has begun to frequent the water and pollute it. The spring rise also reflects the ripening, as a result of higher temperatures, of the infections incurred soon after the winter, and the rise continues into summer when the high temperature causes quick maturation of the infections, and is associated with frequent pollution and the predominance of old snails. Autumn brings a fall.

Pinto and Deslandes (p. 552) have studied the Brazilian Planorbidae, recognizing 5 species of *Australorbis*, including *glabratus* and *centimetralis*.

In comparative physiological studies on two geographical strains of *A. glabratus*, Newton and von Brand (p. 990) found certain differences, which they detail.

Tropicorbis kühnianus is the commonest snail in Cayenne, but Floch and Fauran (p. 379) could not infect it with *S. mansoni*. Intestinal schistosomiasis is not common in French Guiana.

Stirewalt (p. 991) shows that the rates of *A. glabratus* infected after exposure to 1 or 5 miracidia of *S. mansoni* are lower at 23°–25°C. than at 26°–28°C., and that snails tend to lose their infections when kept at low temperatures.

Coelho and Magalhães (p. 175) have experimentally infected *Cebus* monkeys with *S. mansoni*, and Ruiz (p. 279) has found that the coati and the opossum are susceptible. Kuntz and Malakatis (p. 798) in Egypt found the house mouse, the Nile rat, the spiny-back mouse, the jird and the Egyptian bandicoot to be suitable hosts, and they give a list of other suitable animal hosts. But in the examination of 500 rodents and small animals captured in the field, only 1 infection was found, and that was probably accidental.

In experimental work Pifano (p. 992) found that the amount of re-infection that can be induced in guineapigs with *S. mansoni*, 8–12 months after first infection, is considerably limited.

Acid-fast material is present in the capsule of the eggs, and in the miracidium, of *S. mansoni*; Lichtenberg and Lindenberg (p. 551) state that when an acid-fast staining technique was introduced as a routine method of stool examination in Brazil, the proportion of positive results was greatly increased. After an investigation of various methods of diagnosis, Latty *et al.* (p. 993) advocate rectal biopsy, if the faeces are negative by a concentration method, in patients suspected of *S. mansoni* infection.

Oliver-González *et al.* (p. 459) prepared antigens for skin tests from eggs and cercariae of *S. mansoni*. In infected persons almost all reacted to the cercarial antigen but only one-quarter to the egg antigen. Uninfected controls were negative. There is reason to think that after successful treatment the proportion of those reacting to egg antigen rises, and begins to approach the proportion of those sensitive to cercarial antigen. In an investigation of serological reactions in experimental *S. mansoni* infections Stirewalt and Evans (p. 993) found that cercaricidal activity of serum and formation of precipitate round the cercariae did not appear to be related to schistosome infection in the animals tested. The formation of pericercarial membrane, however, was an acquired reaction to the presence of the worms or embryos in the animals, and was produced only around living cercariae. The paper should be read in full.

Examination of soldiers of the regular army of Puerto Rico showed that 18·8 per cent. were passing eggs of *S. mansoni*, 43·5 per cent. were positive to the complement-fixation test and 45 per cent. to the intradermal test. The antigen used for these last two tests was a saline extract of ether-treated adult *S. mansoni* (Horstman *et al.*, p. 174).

In a discussion on the effects of *S. mansoni* infection, reported in the *Ann. Soc. Belge de Méd. Trop.* (p. 988) there was considerable divergence of opinion as to whether this is a serious disease or not. Gillet from the Belgian Congo noted that although the severity varies greatly in different communities, in general it appears that heavy and frequent infections result in severe disease. From S. Rhodesia, however, Morris reported that the infection causes much less ill-health than is ascribed to it in other countries. In Mozambique it is a disease of major importance and de Azevedo urges every effort to combat it. The question of immunity was raised by Rodhain, and the occurrence of hepatic cirrhosis due to malnutrition, malaria and many other causes, which obscure the relationship with *S. mansoni*, was discussed by Schneider and Firket.

Walker *et al.* (p. 278) investigated the haemoglobin levels and blood loss in the stools of Bantu miners infected with *S. mansoni* in South Africa. The mean haemoglobin levels were within normal limits for Europeans, and blood loss was irregular but slight.

Schistosomiasis of the sigmoid colon is very common in Egypt and Gheita (p. 996) discusses the symptoms and indications for operation. Schistosomal cor pulmonale is rare in Brazil, but de Faria (p. 796) has studied some cases. He describes the pathological changes in the small pulmonary arteries, and considers that the condition is a consequence of either widespread relapsing pulmonary endarteritis followed by intimal fibrous thickening, or of pulmonary arterial obstruction by schistosomal granulomata. Bogliolo (p. 906) discusses the anatomical changes in the liver in *S. mansoni* infection—cirrhosis (mostly of the coarse " clay-pipe-stem " type but occasionally diffuse) with disturbance of the portal circulation in the coarse forms.

An electrophoretic study of the serum in patients with *S. mansoni* infection and hepato-splenomegaly, is reported by Fiorillo (p. 994).

Dias *et al.* (p. 554) write favourably of the rapid intensive treatment of *S. mansoni* infections with sodium antimony tartrate, giving 7·5–8 mgm. per kgm. in 1 day, or 12 mgm. per kgm. in 2 days.

Bellon (p. 1205) reports favourably on the early results of treatment by stannous oxide given by mouth. Symptoms were rapidly lessened, and the faeces became negative in more than half of the patients.

Copper oleate solutions kill cercariae of *S. mansoni*, but Moon and Hunter (p. 909) did not find that an ointment of this substance gave complete protection to mice.

Sodium pentachlorophenate has been used in streams for the control of *Australorbis glabratus* and *Tropicorbis centimetralis* by Dobrovolny and Barbosa (p. 380), who report complete reduction in the snail population in some streams, after a single application, for periods up to 12 months where the chemical was applied in the most effective conditions. In other conditions it was less effective. It was applied as 1 oz. briquettes suspended in muslin bags or on a copper screen, or by the drip method, or by spraying.

High activity against *A. glabratus* was found by Nolan and Bond (p. 555) in derivatives of abietic acid.

Texera and Vicente Scorza (p. 660) report experiments on the action of *Bacillus pinotii* on *A. glabratus*, and Dias (p. 797) reports continued success with this organism, and also with *Saccharomyces cerevisiae* which, in relatively high concentration, seems to have a residual action in stagnant water.

Schistosoma japonicum infections

McMullen *et al.* (p. 910) report observations made by a WHO team in the Philippines, who point out that *S. japonicum* infection there is primarily a rural disease. For the first time *O. quadrasi* has been found in streams in virgin forest on alluvial plains. *S. japonicum* is also present in forested areas, and the commonly accepted relationship between the disease, man and rice farming is probably a comparatively recent development. Under existing conditions the use of molluscicides is impracticable, and any campaign must first depend on environmental control. In Formosa *S. japonicum* was found by Hsü *et al.* (p. 663) in 62 per cent. of 100 dogs, and also, in much smaller proportions, in buffaloes, goats and pigs.

Sandground and Moore (p. 800) have used a modification of Standen's technique (with sodium alginate previously mixed with food material and coated with calcium chloride solution) for the rearing of *Oncomelania* species in Petri dishes.

DeWitt (p. 381) investigated the susceptibility of certain species of *Oncomelania* to geographically different strains of *S. japonicum*, and also

found that *Pomatiopsis lapidaria* from Washington, U.S.A., is susceptible to some of these strains.

Sugiura *et al.* (p. 176) studied the factors which influence the hatching of eggs of *S. japonicum*. Temperature is not a critical factor, but although eggs may hatch in total darkness, light causes an increase in hatching. The optimum *p*H is 5·0–8·0. Faecal decomposition tends to suppress hatching, and great dilution of faeces is necessary before hatching occurs freely.

With an intradermal test in which the antigen was an extract of pulverized adult *S. japonicum*, Okabe *et al.* (p. 661) found that only two-thirds of patients with chronic infection gave positive results, and that there were many negative results in acute infections. With a precipitin test in which the same antigen was used all the acute cases and almost all the chronic cases tested reacted at 1 in 800, and the authors regard this as a useful diagnostic test. Needle biopsy of the liver has been found most valuable as a diagnostic measure in *S. japonicum* infection by Yoshizumi (p. 662) who has found eggs in this way when none could be found in the faeces.

Other schistosomes

An endemic focus of *S. intercalatum* infection in Libreville is described by Lalouel (p. 381).

Observations on the penetration of the skin of rabbits by the cercariae of *S. bovis* are recorded by Deiana (p. 910); some details are given in the original abstract.

A general account of swimmer's itch is given by Haemmerli (p. 57). De Meillon and Stoffberg (p. 382) report it from Africa for the first time, and Sandosham (p. 383) discusses it in Malaya, where the cercariae concerned are probably of the *elvae* group. An outbreak in bathers in Lake Ontario is reported by Mitchell (p. 663).

Other trematodes

A case of infection with *Heterophyes heterophyes* is reported for the first time from Greece by Sphangos (p. 462); the infection was due to the consumption of a fish (*Mugil cephalus*) which is an intermediate host.

Korea is the home of paragonimiasis, and 5–25 per cent. of the people are probably infected. On the whole it is a benign and chronic disease, but may be acute, and may be associated with tuberculosis and avitaminosis. Germer (p. 1207) describes 5 cases of extrapulmonary paragonimiasis; the fluke can probably remain alive in the human body for 20 years or more. Chung and Hou (p. 802) have cured 7 patients by giving up to 0·5 gm. of chloroquine base twice daily by mouth for courses lasting 93–231 days (with interruptions), the total dosage varying from 26·84 to 85·75 gm. No severe toxic effects were noted, but there were minor disagreeable symptoms. [These are enormous doses compared with those used in the treatment of malaria.] Crane *et al.* (p. 911)

also have used chloroquine, giving 0·5 gm. [presumably of the salt] thrice daily by mouth for 2 weeks, together with preparations of vitamins and other substances. The stools became negative in 12 of 34 patients, and the numbers of eggs were reduced in 17 others.

Clonorchis sinensis infection is common in Southern Korea. Germer *et al.* (pp. 801, 1206) state that infected persons may be symptomless carriers or may show cirrhosis of the liver; the number of worms and duration of infection are important factors. They describe the clinical features. Treatment with gentian violet, Fuadin, Resochin [chloroquine], emetine and sulphadiazine, in various combinations, was unsatisfactory.

Kendall (p. 384) shows that in Pakistan the snail host of *Fasciola hepatica* is *Limnaea truncatula*, and of *F. gigantica* it is *L. auricula rufescens*, and that these snails differ markedly in ecological requirements and geographical distribution. Similar differences are probably to be found elsewhere.

Yasuraoka (p. 58) has studied the reactions of the miracidium of *F. hepatica* to light. Dawes (p. 1103) has kept *F. hepatica* alive for 12 or more days in a medium which he describes; earlier methods had not been successful for more than 2 days.

After testing various fractions of the parasite substance of *F. hepatica* as antigens in the complement-fixation test Minning and Fuhrmann (p. 998) conclude that alcoholic extracts of the whole worm are best.

The action of certain thiazines and other drugs *in vitro* on *F. hepatica* and *Ascaris lumbricoides* is reported by Mackie *et al.* (p. 664).

In part of Bihar Kant and Rama (p. 177) found *Fasciolopsis buski* in the stools of 7 per cent. of a large number of people examined after administration of tetrachlorethylene. They note the symptoms complained of, mostly abdominal, but many patients were anaemic. Water-chestnuts and snails abound, and *F. buski* was found in the intestine of several wild pigs. Encysted cercariae were found on the water-chestnut and the leaves of the lotus.

Cestodes

Silverman (p. 802) gives an account of the morphology and development of the hexacanth embryo of certain species of *Taenia*.

In a description of the common manifestations of cysticercosis Bickerstaff (p. 998) mentions disordered behaviour, pareses, sudden attacks suggesting acute intermittent obstructive hydrocephalus, and other symptoms, especially those which may be related to cerebral vascular lesions.

Benetazzo and Salemme (p. 912) have found that cross-reactions with precipitin and complement-fixation tests with extracts of *T. saginata* and hydatid fluid occur in some patients infected with these worms. Infection with *T. saginata* leads to the formation of immune bodies, and

reactions show group specificity and may be positive even after expulsion of the worms.

Taeniasis is common in Yugoslavia where Lepeš (p. 463) states that in some areas *T. saginata* is found in more than 15 per cent. of the people and cysts in more than 30 per cent. of the cattle. *T. solium* and *H. nana* are also found. The author advocates mepacrine (0·02 gm. per kgm.) by duodenal sound, followed by magnesium sulphate, in treatment. For the treatment of *T. saginata* infections Fabienke (p. 58) also regards mepacrine as the drug of choice, the dose being 1 gm. by duodenal or jejunal sound, followed one hour later by 60–80 cc. of 30 per cent. $MgSO_4$ solution. If the worm is not expelled, the $MgSO_4$ is repeated. Rafaelsen (p. 385) gives 800 mgm. by mouth, followed by laxatives and an enema. This treatment may be repeated next day.

For taeniasis Ahumada *et al.* (p. 556) have used Azacrin, an acridine derivative, which they think is as effective as mepacrine, and rather less toxic. The maximum total dose for adults was 700 mgm., given with sodium bicarbonate half an hour after a dose of phenobarbital to reduce nausea, and followed in 2 hours by sodium sulphate.

Szkutnik (p. 464) has investigated the possibility of sterilizing measly pork by steeping it in brine. Isolated cysts are killed in 4·5 per cent. salt solution, but for use with pork in large pieces even a 20 per cent. solution acting for 21 days cannot be relied upon, and the author concludes that the meat can be sterilized with certainty only by the use of heat.

Heavy rates are quoted by Pellegrini and Cilli (p. 803) for hydatid disease of sheep, cattle, goats and swine in Italy, especially in the islands. Human infections were most common in the islands and in central and southern Italy in the period 1941–52. The disease has apparently progressively increased, and the authors discuss control measures aimed especially at dogs.

In Chile in 1953 526 patients were admitted to hospital with hydatid cyst, and 23 died (Neghme *et al.*, p. 557). An extensive study of hydatid disease there is reported by Sotomayor Díaz *et al.* (p. 1207).

Vogel (p. 1208) gives reasons, based on field observations and experimental work, for thinking that the human alveolar *Echinococcus* (which has a restricted geographical distribution) is a different species from *E. granulosus*; he names it *E. multilocularis* after Leuckart. Its definitive hosts are probably foxes, dogs and cats, and the natural intermediate hosts are field mice and other rodents, and occasionally man; herbivora seem to play no part in its life history. He gives a list of anatomical features which differentiate this as a separate species. Walshe (p. 386) describes echinococcosis alveolaris of the liver, for the first time in Britain.

Pérez-Fontana (p. 59) describes a method for finding and conserving helminth eggs, especially those of *E. granulosus*.

Simitch and Keckarovska (p. 386) report experiments on the infection

of *Citellus citellus* by means of cysticercoids, scolices and strobilae of *Hymenolepis nana*. Simitch and Petrović (p. 665) gave eggs of human *H. nana* to *C. citellus*, which became infected as easily as with *H. nana* var. *fraterna*, and they conclude that these parasites are identical. Nevertheless they do not consider that rodents are important sources of infections in man. The longevity of eggs of *H. nana* in faeces of *C. citellus* was found to vary from 24 hours in dry faeces at 20°C. to 1 hour at 40°–42°C. in direct sunlight, and in water from 30 days at 20°C. to only 24 hours at 40°–42°C. in direct sunlight. In dry faeces the eggs could live for 6 days at 0°C. Simitch *et al.* (p. 913) in reporting this add that they think that although rodents can in certain cases be sources of human infection, in nature man is the chief source for man, and rodents for rodents.

A case of human infection with a *Mesocestoides*, probably of a new species, is reported from Ruanda-Urundi by Fain and Herin (p. 914). The natural host is apparently an indigenous domestic cat, and larvae have been found in rodents, insectivores and birds.

Baer (p. 1210) reports the third case of infection with *Inermicapsifer arvicanthidis* in man in East Africa. It may be commoner than has been supposed, since owing to the small size of the segments they are likely to be overlooked.

A case of human cerebral coenuriasis (the 9th to be recorded) is reported by Ranque and Nicoli (p. 913).

Lumme *et al.* (p. 384) have investigated the excretion of uropepsin in pernicious tapeworm anaemia, comparing it with the excretion in Addisonian pernicious anaemia. Details are given in the original abstract. Siurala (p. 664) has investigated the gastric mucosal lesion in pernicious tapeworm anaemia.

A sparganum (probably *Diphyllobothrium erinacei*) is reported in a subcutaneous nodule of a woman in Australia; Sandars (p. 462) thinks that the infection was probably contracted through eating the meat of wild pigs.

A sparganum of unidentified species is reported by Yogore and Tangco (p. 912) from a woman in the Philippines. *Charles Wilcocks*

(*To be continued*)

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Smith, W. D. L. **Malaria and the Thames.** *Lancet.* 1956, Apr. 14, 433–6, 6 figs. [12 refs.]

Malaria has a long recorded history in England dating back to Anglo-Saxon times and has for the most part been distributed along the east and south coasts from the Humber to the Isle of Wight. Within this area prevalence has been most marked along the Thames Estuary, in the north along the Essex marshes and in the south in those near the mouth of the Medway. There was a marked decline in incidence in the second half of the nineteenth century, probably owing to agricultural improvement which had not this intentional object. During and immediately after the 1914–18 war many cases of relapsing malaria were imported from abroad. Unfortunately a camp receiving many such cases was established in the Island of Grain on the southern part of the Thames' Estuary north of the Medway, previously an important focus of this disease. *Anopheles m. atroparvus* there bred freely in the saline marshes and induced a local epidemic of *P. vivax* malaria of 481 confirmed indigenous cases. A similar recrudescence being feared in the 1939–45 war, a map was prepared, and is here reproduced, showing areas of high, moderate and low susceptibility to the establishment of endemicity, and was used in the location of troops returning from malarious areas. No important outbreak occurred but the few indigenous cases reported showed the correctness of the appreciation. Recent industrial development includes the construction of a great oil refinery in the Isle of Grain on which there were at one time 8,000 construction workers, many of them from malarious parts of the world, but the maintenance of precautions, entomological and clinical, has prevented the re-appearance of any epidemic. Perhaps malaria in the Thames area is ended and all that remains is the nuisance of mosquito bites. *G. Macdonald*

de Jong, C. & Kraan, H. **An Autochthonous Case of Malaria near Eindhoven.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, Mar., v. 8, No. 1, 70–74. [10 refs.]

A 6-year-old boy contracted *Plasmodium vivax* malaria in the village of Acht near Eindhoven in North Brabant, Holland [this *Bulletin*, 1955, v. 52, 505]. He became ill on May 3, 1954, and had probably been bitten by an infected mosquito about 270 days previously (as such is the long incubation period of the parasite) or about August 1953. At that time, a soldier from Korea had an attack of *P. vivax* malaria in barracks

near the boy's home. *Anopheles maculipennis atroparvus* adults and larvae were found in the vicinity, and this species was presumed to be the carrier.

There were 73 (31 autochthonous) and 52 (19 autochthonous) cases of malaria in 1953 and 1954 respectively in the endemic area of North Holland; probably all were derived from exotic strains.

P. C. C. Garnham

See also p. 1044, Raper, **Sickling in relation to Morbidity from Malaria and other Diseases.**

Senevet, G. & Andarelli, L. Les soies antépalmées chez les larves d'Anophèles, Leur utilisation comme caractères de groupe (II[e] note). [**The Antepalmate Hairs in Anopheline Larvae. Their Use as Group Characters. Second Note**] *Arch. Inst. Pasteur d'Algérie.* 1955, Dec., v. 33, No. 4, 322–43. [19 refs.]

The authors continue their taxonomic studies of the antepalmate hairs of the larvae of *Anopheles* mosquitoes. They have shown how these hairs can be used as supplementary aids in the systematic classification of anopheline mosquitoes [this *Bulletin*, 1956, v. 53, 7].

They have been able to add further data as a result of the examination of material in the collection of the British Museum (Natural History) and of published records omitted from their previous paper.

The accumulated information about the branching of these hairs in some 160 species is presented in tables occupying 16 pages.

H. S. Leeson

Fischer, L. & Schupp, E. Untersuchungen über die Anophelen des Bodenseegebietes. [**Studies of Anophelines in the Lake Constance Area**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, v. 7, No. 1, 1–14, 7 figs. [Numerous refs.]

The English summary appended to the paper is as follows:—

"The anopheles fauna was surveyed on the shore of the Lake of Constance and in a tributary valley only a few kilometers distant from the lake. It was found that Anopheles maculipennis messeae preferred the swampy shore area with relatively even temperature and humidity, while Anopheles maculipennis typicus predominated in the cultivated valley where the daily changes of temperature and humidity were more pronounced. Although the climate expressed in monthly averages was the same in both regions the two anopheles species kept distinctly separate in their habitats. They obviously react to minor climatic factors. Typicus seems to have a better chance than messeae to survive in cultivated regions. Typicus is also supposed to have less contact with men; and the decline of human malaria following soil amelioration in

endemic areas may be due not so much to a reduction of anopheles in number but to changes in the anopheles population."

See also p. 1057, MELLANBY, **Mosquito Populations at Ibadan in Nigeria.**

SHUTE, G. T. **A Method of Maintaining Colonies of East African Strains of *Anopheles gambiae*.** *Ann. Trop. Med. & Parasit.* 1956, Mar., v. 50, No. 1, 92–4.

Several thousand *A. gambiae* eggs are hatched in an enamel bowl, 10 inches × 12 inches, containing distilled water to a depth of 1½ inches. The local (Amani, Tanganyika) stream-water (*p*H 6·5) and rain water are also suitable larval media. Forty-eight hours after hatching, the young larvae are separated in groups of 100–150 into fresh bowls. The water temperature is maintained at 24–6°C.; at higher temperatures the water must be changed on the third or fourth day after separation or the larvae are liable to die. Mortality is very high when larvae are overcrowded.

The larvae are fed on a yeast-water mixture in the proportion of 1 gm. dried yeast tablets per 100 cc. of distilled water. When the eggs hatch 2 cc. of this mixture are pipetted into the bowl. On the day of larval separation 10 cc. are added to each bowl; thereafter 5 cc. are added daily till the larvae pupate. It is essential that the food be prepared fresh each day. Pupae are collected into a small bowl placed inside a cage (1 foot cube) for adults to emerge. Egg production is prolific when about 300–400 adults (both sexes in equal numbers) are kept in one cage in total darkness. The females are fed on human blood. Feeding is less painful for the volunteer if the underside of the calf is placed on top of the cage. The males feed on a 10 per cent. sugar solution. Moist filter paper is provided for egg laying. *W. Z. Coker*

SRIVASTAVA, H. M. L. **Anopheline Fauna of Uttar Pradesh—India. Part I. Vectors of Malaria.** *Indian J. Entom.* 1955, Dec., v. 17, Pt. 3, 363–72, 5 figs. [16 refs.]

The State of Uttar Pradesh in India covers 112,523 square miles and can be divided into 8 physiographical regions. These are described, population figures are listed and a brief account is given of the malaria situation in each.

In one of the regions, the Himalayan West, the Tarai areas of the Naini Tal district are highly malarious but with the clearing of the jungles and the cultivation of the land *Anopheles minimus* is fast becoming extinct. *A. fluviatilis* is now the main vector in the pre- and post-monsoon periods, while *A. culicifacies* is the secondary vector of the monsoons, July to September [this *Bulletin*, 1954, v. 51, 136].

The sub-Himalayan West region is also influenced by the Tarai and *A. fluviatilis* and *A. culicifacies* are the vectors there too. In the other regions *A. culicifacies* is the rural vector, though it has been reported from urban areas, but in towns *A. stephensi* is more important.

Altogether 18 species of *Anopheles* occur in Uttar Pradesh State of which only the 4 mentioned are vectors of malaria. Some general notes are given on the breeding places and feeding habits of these 4 species and a key is given for the identification of the adults. *H. S. Leeson*

Colless, D. H. **Observations on Anopheline Mosquitos of the Akah River, 4th Division, Sarawak.** *Bull. Entom. Res.* 1956, Mar., v. 47, Pt. 1, 115–23, 2 figs.

"Investigations on the Akah river, in the 4th Division of Sarawak, showed 13 species and one variety of *Anopheles* to be present. *A. l. leucosphyrus* Dön., the principal malaria vector, was the only species common in houses.

"*A. l. leucosphyrus* has a strong preference for human blood and feeds throughout the night, with a peak of activity soon after midnight. Both fed and unfed mosquitos rest indoors on the walls but the latter become increasingly scarcer later in the night. Most individuals rest low down (62% below 3 ft., 96% below 5 ft.) but only a negligible percentage remains in the house after daybreak. Observations suggest that many females spend quite long periods resting outside the house before entering and that entry is almost entirely through windows and other openings in the walls; very few enter the space below the house. There is also evidence of two separate stimuli, or levels of activation, one bringing the mosquito to the bait and one initiating the act of feeding.

"Wet weather was accompanied by an abrupt increase in catches of *A. l. leucosphyrus* and dry weather by a decrease—this is thought not to be due to any effect on breeding places. During the wet period, females entered earlier and tended to rest to a greater extent before feeding."

Jensen, D. V. **A Note on some Variations in the Structure of the Salivary Glands of *Anopheles albimanus* Wiedemann (Diptera: Culicidae).** *Mosquito News.* 1956, Mar., v. 16, No. 1, 27–8, 14 figs. on 1 pl.

Burgess, R. W. **Effect of topically applied DDT on Development of *Plasmodium vivax* and *P. falciparum* in *Anopheles quadrimaculatus*.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 163–7.

There was no lethal effect on *Plasmodium vivax* or *P. falciparum* developing under laboratory conditions in laboratory-bred *Anopheles*

quadrimaculatus treated topically with sub-lethal doses of DDT. The dose per mosquito was 0·0524 or 0·0638 μgm. Survivors of these sub-lethal doses were incoordinate in their movements and badly damaged. It is unlikely that they would have been able to seek a meal after oviposition. A direct effect of DDT on the extrinsic cycle of these plasmodial parasites is, then, not evident. Although this factor cannot, therefore, be thought to influence malaria transmission in sprayed areas, it may well be that under field conditions mosquitoes experiencing sub-lethal doses may never take another blood-meal, even if they survive long enough to oviposit. *D. S. Bertram*

See also p. 1060, Clements, **Hormonal Control of Ovary Development in Mosquitoes.**

Ronnefeldt, F. Endemische Malaria und Anämie. [**Endemic Malaria and Anaemia**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, v. 7, No. 1, 48–63, 2 figs. [26 refs.]

The introductory paragraphs of this paper concern themselves with considerations on the life history of the malarial parasites and the possible effects of the exo-erythrocytic cycle on the human organism.

It is a matter of comment with what rapidity the blood regenerates after an acute malaria attack. The behaviour of the 3 main malaria parasites may be detailed in this respect:—

In *P. vivax* infection anaemia is seen only in high degrees of parasitaemia and then only when the infection runs unchecked for one month. In this time the blood count can sink to 1·5 million per cmm. and the haemoglobin to 3·5 gm. per 100 cc.

In *P. malariae* infection the anaemia develops slowly and it takes a month or more to take effect; the blood count rarely sinks below 2·5 million per cmm.

In *P. falciparum* infection the sporulation of the trophozoites in the capillaries of the internal organs has an influence on the anaemia. This infection lasts at the most one year and during this time for 200 days parasites can be demonstrated in the blood and for 40 of these the characteristic gametocytes are present.

Little appears to be known about the anaemia in chronic malaria which is due to continuous reinfection. Haemoglobin readings on the Tallqvist scale in 24 malaria surveys in Colombia, with 2,219 examinations, have been analysed. (This method was adopted as a measure of convenience for mass surveys when more elaborate measures, for obvious reasons, could not be adopted.) With every precaution to obtain correct readings an error of 10 per cent. had to be expected.

A relationship between the haemoglobin rate and age and occupation appears to exist independently of malaria. Thus schoolchildren had

higher rates than those of the same age who did not attend school. In 8 surveys in a hypoendemic area of Colombia, and 16 in a mesoendemic area, the rates for hypochromic anaemia and splenomegaly were observed. In children up to 14 hypochromic values were found twice as often in mesoendemic malaria as in hypoendemic malaria.

[It is difficult to discern the exact objects of this paper: it is based on a relatively small series of cases of proved malaria—46 in all—of which 17 were *P. vivax*, 11 *P. falciparum* and an equal number of *P. malariae*; the remainder were mixed infections.] *Philip Manson-Bahr*

Alfano, A. & Amati, G. Il comportamento dello zolfo ematico nell' infezione malarica. [**The Blood Sulphur in Malaria**] *Acta Med. Italica*. 1955, Aug., v. 10, No. 8, 197–202. [33 refs.]

The authors give an interesting account of the role played by sulphur in human physiology, pointing out that it enters into the composition of all cellular elements; that it is present in considerable amounts in the liver, adrenals and muscles; and that the spleen may act as a sort of reservoir for sulphur.

In blood it is found in two forms, oxidized (SO), and neutral (SN), the SO/SN ratio being approximately 70/30. As the above-mentioned organs are so affected in malaria, the authors examined the SO/SN ratio in 10 cases of primary, and 15 cases of chronic relapsing malaria, all of whom had parasites (in films or sternal puncture); 21 had *P. vivax* and 4 *P. falciparum* and the examination was carried out before any specific treatment had been given.

In the primary cases the blood S content and the SO/SN ratio were within normal limits, but in the relapsing cases there was a marked alteration, as the SN was raised and the ratio reversed.

The authors consider that the disturbance of adrenal activity may be one of the causes of this change, but conclude that the mechanism is multiple and complex. *W. K. Dunscombe*

Winckel, C. W. F. **Quinine Injection in Malaria.** *Pakistan Med. J.* 1955, Dec., v. 6, No. 12, 31–3.

The author again draws attention to the use of quinine hydrochloride parenterally in the following formulae:—

Quinine hydrochlor.	8 grains	(0·5 gm.)
Urethane	4 grains	(0·25 gm.)
Aq. dest. ad	1 ml.	

or

Quinine hydrochlor.	4 grains	(0·25 gm.)
Antipyrin	2 grains	(0·125 gm.)
Aq. dest. ad	1 ml.	

These solutions have a *p*H of 6·1 and 6·5 respectively and are thus less irritant than solutions of quinine dihydrochloride (*p*H 3·5) [this *Bulletin*, 1948, v. 45, 144].

The author is perhaps correct in criticizing British and American workers for being slow to adopt the hydrochloride in place of the dihydrochloride but he is incorrect in his quotations. The latest edition of Manson's Tropical Diseases is dated 1954 [not 1946 as stated] and, like the 1950 edition, does refer to the hydrochloride, as does also Covell *et al.* [*ibid.*, 1955, v. 52, 1157].

[The introduction of parenteral chloroquine reduces the importance of this matter.] *Frederick J. Wright*

Winckel, C. W. F. **The Malaria Patient and Quinine.** *Pakistan Med. J.* 1955, Dec., v. 6, No. 12, 34–6.

The author considers that quinine is a tried remedy in the treatment of malaria and free from danger even when widely distributed. [It is difficult to reconcile this view with the known dangers of precipitation of blackwater fever and the occasional production of blindness by gross overdosage.] He again advocates the use of relatively small doses of quinine salts and points out the irrationality of using the same dose of the bisulphate (containing 59 per cent. base) and the hydrochloride or dihydrochloride (containing 82 per cent. base) [this *Bulletin*, 1948, v. 45, 145].

[Heavy dosage with quinine is in any case now unnecessary as chloroquine and amodiaquine are effective schizonticidal drugs.]

Frederick J. Wright

Ray, A. P., Bami, H. L. & Basu, P. C. **Preliminary Report on the Therapeutic Response to the Active Metabolite of Bromoguanide.** *J. Indian Med. Ass.* 1956, Mar. 16, v. 26, No. 6, 217–19. [13 refs.]

Earlier studies carried out at the Malaria Institute of India have shown that the active metabolite of bromoguanide [this *Bulletin*, 1954, v. 51, 776] has a quinine equivalent of 512 against *P. gallinaceum* [*ibid.*, 1955, v. 52, 16] and of 17 against *P. cynomolgi* [*ibid.*, 515]. The metabolite has now been tested on 11 patients with *P. vivax* and 2 with *P. falciparum* infection. Relief of clinical symptoms and clearance of asexual parasites were observed in all cases within 72 hours, but the action against gametocytes is described as "somewhat slow". These findings are comparable with those recorded by the authors in respect of anti-malarials of the 4-aminoquinoline series. *G. Covell*

Russell, P. F. **Man's Mastery of Malaria.**

This book was reviewed on p. 947.

Saliternik, Z. [**Theoretical and Practical Aspects of Anti-Malaria Work in Israel**] *Harefuah.* Jerusalem. 1955, Oct. 16, v. 49, No. 8, [in Hebrew 178–83. (24 refs.) English summary 183–4].

The English summary appended to the paper is as follows:—

"The history of the antimalaria work in this country from before World War I up to the present is presented under three headings:

"(1) The institutions which have conducted antimalaria activities.

"(2) The changing attitude of the population to the antimalaria activities from hostile to sympathetic and co-operative.

"(3) A description of the situation prior to the beginning of antimalaria work, and the first steps in the organization of systematic activities in the field and in the laboratory.

"The main practical and theoretical achievements in this country in the field of malaria and malaria control during the past 35 years are discussed under the following headings:

"1. The fixing of the radius of antimalaria control at 3 km. around the protected settlement, in spring and summer, and at 10 km. in the regions where *A. sacharovi* is prevalent in autumn.

"2. There are 13 species of Anopheles mosquitoes in this country. In the past the following species were known as important vectors of malaria: *A. claviger*, *A. sacharovi*, *A. superpictus* and *A. sergenti*. Since the application of DDT, the semi-domestic *A. sergenti* is the main vector.

"3. A survey of the data on the stages of infestation of the various Anopheles mosquitoes and their relative importance as malaria vectors during the different seasons of the year.

"4. A detailed and comprehensive description of the morphology, biology and bionomy of those mosquitoes in all stages of development and the influence of various factors such as light, temperature, alkalinity and salinity of water, and winds. Likewise the physiological changes in *A. sacharovi* in autumn were dealt with and the time required for the development of the parasites in the different mosquitoes and the flight ranges of the mosquitoes.

"5. A description of the development of the various methods of practical antimalaria work: technical and chemical measures at the breeding places in the swamps, the discovery and extermination of the adult mosquitoes in their hiding and resting places, the application of modern insecticides, methods of personal protection, etc.

"6. An epidemiological analysis of the changes in malaria incidence data and the influence of DDT spraying on the incidence curve."

Merle, F. Problèmes de lutte antipaludéenne en Afrique Centrale. [**Problems of Malaria Control in Central Africa**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 691–8. [11 refs.]

Africa has been excluded from recent recommendations on the elimination of malaria, and perhaps rightly so. The administrative

background is still only a skeleton and the people are largely unacquainted with the reasons behind health programmes; communications are poor and the economic level is low; above all the intense endemicity associated with transmission by *Anopheles gambiae* makes control especially difficult. Reviewing the mechanisms which might be generally applied it is concluded that drainage, chemoprophylaxis and larvicidal attack are all inappropriate to any mass campaign in Africa. Imagicidal attack, however, originated in Africa and contains within itself the seeds of possible success. Fully valuable results can, however, only be expected if it is undertaken on a vast scale, and if the nations of Africa combine to ensure that the attack is carried out over great areas leading up to natural rather than political boundaries. This would involve a coordination of activity between nations and operation on an unforeseen scale, but it is a possibility. The multiplication of small schemes using a variety of insecticides and without natural boundaries is strongly deprecated. It can only lead to the production of resistance which will militate against successful work later throughout the whole of the area. In large schemes it will be necessary to use an insecticide not previously applied within that area and preferably one of long persistence so that frequent re-application is unnecessary. Firm administrative control securing the treatment of a high proportion of places will also be necessary. Programmes of this sort offer the only prospect of control throughout large parts of Africa but they could succeed in restricting its most important disease. *G. Macdonald*

Christie, M. & Webbe, G. **The Susceptibility of Fourth-Stage Larvae of *Anopheles gambiae* to DDT and Dieldrin.** *Bull. Entom. Res.* 1956, Mar., v. 47, Pt. 1, 1–6, 1 fig.

The authors have discussed the minimum lethal dose (MLD), as distinct from the median lethal dose and the minimal lethal dose, as a practical concept for measuring toxicity, despite its obvious lack of precision. The minimum lethal dose is defined as the lowest dose proving fatal to all individuals exposed to it, as determined by inspection and rough interpolation. Provided it falls within economic limits it is of much greater interest in vector eradication programmes.

The authors investigated, in Africa, the susceptibility of fourth-stage larvae of *Anopheles gambiae* to DDT and dieldrin to obtain a basis for comparison with experience gained on the American continent and also to obtain a reference point for future incidence of resistance.

Wild females of *A. gambiae* were reared in the laboratory, and only fourth-stage larvae not more than 12 hours old were used in the tests. The jars used contained 240 ml. water; observation period was 48 hours and all larvae pupating were discarded. The insecticides were measured out with an " Agla " microsyringe capable of delivering accurately to

± 0·005 ml. Solvents used for the stock insecticide solutions were acetone and oil (kerosene + 2 per cent. of blown fish oil to enhance spreading of oil on water surface). For tests with oil solutions of insecticides the spread must also be even, and the authors describe a simple apparatus which makes use of water running from below into a funnel arrangement consisting of the top half of a 32 oz. bottle, thus permitting any surface active material to be floated off before the insecticide is applied.

The results show that the 48 hr. MLD for acetone-water suspension of DDT to *A. gambiae* is about 0·06 p.p.m. For dieldrin it is 0·01 p.p.m. In oil solutions the MLD is approximately 0·001 lb./acre for dieldrin and 0·02 for DDT, a toxicity ratio of 20 to 1. *W. Z. Coker*

Burnett, G. F. **Variation in Mortality with Differences in Humidity among Mosquitoes exposed to BHC, Dieldrin and DDT.** [Correspondence.] *Nature.* 1956, Apr. 7, v. 177, 663–4.

In this correspondence, the writer draws attention to the probable significant role of high atmospheric humidity in causing pronounced kills among mosquitoes exposed to BHC, dieldrin and perhaps DDT.

At Taveta, Kenya, where for the past 7 years residual insecticides have been continuously applied in experimental huts, it is observed that the rather low dry season mortality in female anophelines (*Anopheles gambiae* and *A. funestus*) entering houses treated with BHC and dieldrin, is considerably augmented on the onset of the next rainy season. This phenomenon is observed both in houses with porous and impervious walls. It was, however, not observed in houses treated with DDT, but Hocking [this *Bulletin*, 1947, v. 44, 879] records an increase in kills in a tent treated with DDT dissolved in kerosene when heavy rain fell.

The suspicion is that rising atmospheric humidity may be the reason for the increased mortalities. Should this be correct, the phenomenon will be of practical interest in two ways. First, an insecticide-spraying routine which is quite adequate in localities with high humidity, say coastal or forest areas, may not necessarily be effective in dry localities even in the same country. Secondly, when testing the persistence of residual insecticides, or detecting possible acquired resistance to insecticides, misleading results are possible unless test conditions are standardized with regard to humidity. *W. Z. Coker*

Shama Sastry, H. **A Review on Malaria Investigations in Mysore State.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1956, Jan., v. 4, No. 1, 1–16, 1 folding map. [29 refs.]

"Investigations conducted in Mysore State during the forty years on epidemiology of malaria, anopheline fauna and control measures adopted

are briefly reviewed. Interruption of one or two rounds of residual insecticidal spray in areas where control measures have been in progress for some years is indicated."

Puerto Rico: Bureau of Malaria & Insect Control. **Malaria Control in Puerto Rico (a Summary of Accomplishments) 1924–1954.** *Bol. Oficina Sanitaria Panamericana.* 1955, Nov., v. 39, No. 5, 489–93, 1 map & 1 graph.

Malaria was widespread in Puerto Rico causing substantial morbidity and usually over 2,000 deaths each year in a population of 1½ million. Control was first started in 1924, sponsored by the Rockefeller Foundation but later transferred to the Bureau of Malaria Control of the Department of Health. The vector, *Anopheles albimanus*, was controlled by Paris green and other larvicidal measures while therapy was given an important place. DDT was first used in 1944 and had become general in 1954, latterly with one annual application to houses. By 1954 the reported case rate per 100,000 had dropped from 1,989 to 0·6 and the mortality from 144 to 0·13. In this last year only 13 cases were reported, 5 Korean veterans, 3 sailors in transit, 3 deaths and 2 other cases. Only one was confirmed in the laboratory, *Plasmodium malariae* in a 34-year-old lady which was found to have been a relapse. Thus no primary indigenous case was confirmed despite careful search and so far in 1955 only 2 cases have been reported, both imported. *G. Macdonald*

Yoeli, M., Becker, Y. & Bernkopf, H. [**The Effect of West Nile Virus on Experimental Malaria Infection** (*Plasmodium berghei*) **in Mice**] *Harefuah.* Jerusalem. 1955, Sept. 15, v. 49, No. 6 [in Hebrew 116–19, 1 chart. English summary 119].

The English summary appended to the paper is as follows:—

"Infection with West Nile virus was found to have a marked interfering action upon the course of *Plasmodium berghei* infection in white mice. The effect was demonstrated by a considerable reduction in the number of parasites or their total suppression, in peripheral blood. A similar effect was obtained with the virus of ornithosis, but not with the virus of influenza A.

"The mechanism of the effect of these viruses and other agents is under study."

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Ryley, J. F. **Studies on the Metabolism of the Protozoa. 7. Comparative Carbohydrate Metabolism of Eleven Species of Trypanosome.** *Biochem. J.* 1956, Feb., v. 62, No. 2, 215–22, 3 figs. [27 refs.]

"1. *Trypanosoma rhodesiense, T. gambiense, T. brucei, T. evansi, T. equinum* and *T. equiperdum* degrade glucose to a mixture of pyruvic acid and glycerol; glycerol production is favoured by anaerobic conditions. The R.Q. is small, usually less than 0·10.

"2. *T. cruzi* and *T. lewisi* convert glucose into a mixture of lactic, acetic and succinic acids; *T. congolense* and *T. vivax* produce glycerol, acetic acid and succinic or lactic and pyruvic acids; and *Stringomonas oncopelti* forms glycerol, ethanol, pyruvic and succinic acids. In all cases the R.Q. is high, about unity.

"3. The respiration of *T. cruzi, T. lewisi* and *S. oncopelti* is very sensitive to cyanide, that of *T. congolense* is slightly sensitive, and the respiration of *T. vivax* and *T. rhodesiense* is insensitive to the inhibitor; cytochrome pigments have been detected in *T. cruzi, T. lewisi* and *S. oncopelti*, but not in *T. congolense, T. rhodesiense* or *T. equiperdum.*

"4. Homogenates of *T. cruzi, T. lewisi, S. oncopelti, T. congolense, T. vivax* and *T. rhodesiense* have been examined for cytochrome and succinic-oxidase activity; such activity has been found in all preparations to a varying extent."

Grant, P. T. & Fulton, J. D. **Glucose Catabolism by Strains of *Trypanosoma rhodesiense*.** *Biochem. J.* 1956, May, v. 63, No. 1, Proc. Biochem. Soc. 8P–9P.

Schenone, H., Ardiles, M., Lolas, J. & Niedmann, G. Un caso de cardiopatía chagásica. [**One case of Cardiac Chagas's Disease**] *Bol. Chileno de Parasit.* 1955, July–Sept., v. 10, No. 3, 58–61, 2 figs. English summary (6 lines).

Pizzi, T. & Knierim, Feliza. Modificaciones del bazo en relación con la tasa de anticuerpos circulantes en ratones experimentalmente infectados con *Trypanosoma cruzi*. [**Spleen Changes correlated with Circulating Antibody Titres in Mice experimentally infected with** *Trypanosoma cruzi*] *Bol. Chileno de Parasit.* 1955, July–Sept., v. 10, No. 3, 42–9, 4 graphs. [11 refs.]

The English summary appended to the paper is as follows:—

"The immunization of C3H mice with low-virulent cultures of

Trypanosoma cruzi was accompanied by a marked increase of the size of the spleen, which was due to hyperplasia of the white pulp with increase of medium and large lymphocytes. These changes were associated with the production of antibodies, as shown (1) by the parallelism between the morphologic changes of the spleen and antibodies curves, and (2) by the significant depression of antibodies titers in splenectomized animals, as compared with the intact ones.

" The inoculation of a ' test dose ' of virulent trypanosoma stages, in the previously immunized animals, was followed by a new increase in the spleen size. In this instance, however, the rise of antibody titers was much lower and the main changes in the spleen, were observed in the red pulp, which appeared hyperplastic and with marked increase in the erythropoietic activity.

" Although the splenectomy depressed antibody formation it had no effect on the course of the infection under the experimental conditions employed in this work."

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

McKinnon, J. A. & Fendall, N. R. E. **Kala-Azar in the Baringo District of Kenya. A Preliminary Communication.** *J. Trop. Med. & Hyg.* 1955, Sept., v. 58, No. 9, 205–9, 2 maps.

The authors give a concise, but very informative, account of the geophysics and ethnography of the Baringo district of Kenya. In all but one instance, the patients with kala azar reported came from the Kerio River valley, the floor of which is about 3,500 feet, or from areas of comparable level. Up to 1954, only 3 cases of kala azar had been reported from this district [this *Bulletin*, 1953, v. 50, 496; 1955, v. 52, 520], but in October of that year another, a pathologically proven case, was reported from Maji Moto near Lake Hannington; during the next 10 months 7 more proven cases were reported. In a cursory survey 6 more suspected cases were noted and 2 others from elsewhere of which 1 was subsequently confirmed as kala azar. All the patients were children or young adults and all but one from the Tugen tribe. (In the 1948 census this tribe constituted 61,000 out of 72,000 of the inhabitants of the district.)

Five patients lived within 5 miles of one another; the rest were distributed more widely. All but 2 cases were on the cattle trade route from Turkana in the north running through Karpeddo, Nginyang, Marigat and Emening.

Sandflies abound in this district and are being investigated, but no infected dogs have been reported. "It remains therefore debatable whether the disease is of old endemicity and of little danger, or whether we are seeing the very commencement of a new epidemic. . . ."

L. E. Napier

Grossowicz, N. & Citri, N. [**Cultivation of *Leishmania tropica* under Defined Conditions**] *Harefuah*. Jerusalem. 1955, Sept. 15, v. 49, No. 6 [in Hebrew 119–21, 1 chart. (11 refs.) English summary 121].

The English summary appended to the paper is as follows:—

"A liquid medium, in which blood is replaced by haemin, serum albumin and tomato juice, has previously been found suitable for continuous propagation of *L. tropica*. The tomato juice has now been replaced by chemically defined compounds. The medium thus obtained provided optimal growth conditions for all of the 31 strains of *L. tropica*, kindly provided by the Department of Parasitology, Hebrew University.

"Since in this medium all crucial factors are supplied as defined components, a systematic analysis of the biochemical requirements of *L. tropica* is now possible. Thus, with cells suitably depleted by successive transfers on vitamin deficient media, specific requirements for thiamin, riboflavin and folic acid were demonstrated. On the other hand, the requirement for ascorbic acid or for other unusual factors, allegedly supplied by serum, could not be confirmed. The specific role of blood serum, considered indispensable for propagation of *L. tropica*, may be traced to its albumin content. The albumin fraction appears to serve as a detoxifying vehicle for an essential but toxic lipid, analogous to its function for *Trypanosoma cruzi*."

[See this *Bulletin*, 1956, v. 53, 297.]

Deane, L. M., Deane, M. P. & Alencar, J. E. Observações sôbre o combate ao *Phlebotomus longipalpis* pela dedetização domiciliária, em focos endêmicos de calazar no Ceará. [**Control of *Phlebotomus longipalpis* by Spraying of Houses with DDT in Endemic Areas of Kala Azar in Ceará, Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1955, Jan., v. 7, No. 1, 131–41, 1 graph. [14 refs.] English summary.

In the mediterranean region and elsewhere, considerable success in reduction of *Phlebotomus* has resulted from DDT spraying of houses, which had usually been done as an anti-malarial measure. The authors decided to try this method of reducing kala azar in the State of Ceará, Brazil. Previous work had shown that *P. longipalpis* was the main and possibly the sole vector of leishmaniasis in this area [this *Bulletin*, 1955, v. 52, 884]. Four rural areas were chosen for the trial. In 2 of them

(with populations of 1,500 and 650 people) all houses and animal shelters were sprayed with DDT at 2 gm. per sq. metre of wall surface. The other areas (populations: 200 and 55 people) were kept as a control.

Monthly catches of *Phlebotomus* showed that the DDT very much reduced their numbers inside houses for at least 4 months. In the animal shelters the effect was less prolonged and, at the end of 4 months, was negligible. (This was probably because their construction was worse than houses and the insecticide was partly exposed to weathering.) The DDT treatment had no effect on outdoor populations of *Phlebotomus*, as measured by those coming to animal traps. In spite of this, the suppression of house infestations may reduce disease, since biting is mainly at night, at which time the very susceptible young children would be indoors. It is too early yet to determine this. *J. R. Busvine*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Khanna, S. D. & Singh, M. **Weil-Felix Titres in Normal Subjects and Non-Typhus Fever Cases.** *J. Indian Med. Ass.* 1956, Feb. 16, v. 26, No. 4, 123–6. [14 refs.]

The authors give the results of 2 series of tests by the Weil-Felix reaction of groups of 200 persons in Amritsar in the north-west of India. One group consisted of healthy persons, the other was of hospital patients suffering from fevers other than typhus. The percentages of positive reactions at a titre of 1 in 25 are shown in the table; the figures in brackets refer to reactions at 1 in 125 which was the highest titre observed. For comparison the results found at the Medical Research Council Laboratory, London, for " normal " persons are given; the titres in this series were 1 in 32 or over and 1 in 128 respectively and so are approximately comparable [see this *Bulletin*, 1942, v. 39, 821].

	Proteus OXK	*Pr. OX2*	*Pr. OX19*
Normal persons, Amritsar	62·0 (1·0)	67·5 (5·0)	35·0 (1·0)
Non-typhus patients, Amritsar	55·5 (5·5)	70·0 (3·5)	46·0 (5·5)
Medical Research Council, London, normal persons	85·0 (3·0)	19·0 (0)	19·0 (1·0)

In other reports from India and the U.S.A. equally high or higher titres are recorded with *OXK* except for one record from Bombay in which

the percentage was only 0·2 [*ibid.*, 1948, v. 45, 701]. For *OX2* all the other recorded titres for healthy persons are much lower except for one from U.S.A. (50·2 to 63·0) and the present authors surmise as to " the possibility of some inapparent cases of typhus going undiagnosed in Amritsar ". [A more likely explanation seems to be that the strain of *Proteus OX2* happened to be exceptionally agglutinable by normal serum.]

In another experiment it was found that the Weil-Felix titres of 50 healthy students remained unchanged after they were inoculated with two doses of TAB. *John W. D. Megaw*

Milovanović, M. V. & Stojković, L. V. **Agglutination of Red Blood Cells, sensitised with a Polysaccharide Substance extracted from** *Proteus OX-19*. **I. Use in Serological Diagnosis of Typhus Fever.** *Acta Med. Iugoslavica.* 1955, v. 9, Nos. 2/3, 140–48, 1 fig. [11 refs.]

The authors describe a study of several serological tests for the diagnosis of louse-borne typhus fever; they have specially studied the results obtained by employing the polysaccharide extracted from *Proteus OX19* as the antigen instead of the bacilli themselves.

Comparative trials were made of the following 5 tests in 11 healthy persons and 4 patients with fever other than typhus: (1) the standard Weil-Felix test, (2) the standard complement-fixation test, (3) the haemagglutination test, (4) the haemolytic test and (5) the complement-fixation test with the polysaccharide of *Pr. OX19* as antigen. The 15 subjects of the tests were residents in a well known area of typhus endemicity.

With the Weil-Felix test the titres ranged from less than 1 in 20 (6) to 1 in 80 (3) but none of the reactions was significant. The complement-fixation titres ranged from less than 1 in 8 (13) to 1 in 64 (1). The haemagglutination test titre ranged from less than 1 in 5 to 1 in 40. The modified complement-fixation test with polysaccharide antigen was completely negative in all and so was the haemolytic test, so that these tests were more strictly specific than the others.

The same 5 tests were made on 9 occasions between the 6th and 32nd day on a typhus patient and all gave definitely rising titres which reached about 1 in 600 by the 8th to the 10th day with the haemolytic test and both of the complement-fixation tests. With the Weil-Felix test the titre rose to over 1 in 1,000 and with the haemagglutination test it rose to 1 in 20,000; this very high titre was obtained by sensitizing the erythrocytes with the optimum amount of polysaccharide and the test is considered specially suitable because of its high sensitivity and the fact that a reading can be made within 2 hours.

The haemolytic test and the complement-fixation test with polysaccharide antigen have the advantages of being strictly specific, but the

latter is said to demand an experienced team for its execution. The Weil-Felix test usually gives definite indications because of the high titre reached after the end of the first week.

Details of the technical methods employed will be found in the paper.

John W. D. Megaw

Milovanović, M. V. & Stojković, L. V. **Agglutination of Red Blood Cells, sensitised with a Polysaccharide Substance extracted from *Proteus OX-19*. II. Application of the Haemagglutination Inhibition Test in the Early Diagnosis of Typhus Fever.** *Acta Med. Iugoslavica.* 1955, v. 9, Nos. 2/3, 151–6.

The authors have found it possible by the haemagglutination-inhibition test to detect the polysaccharide antigen of *Proteus OX19* in a dilution of 1 in 32,000,000 in a volume of 4 ml. of normal saline or of healthy human urine. They regard this finding as justifying the expectation that the test will be applicable for the early diagnosis of louse-borne typhus. The test is based on the same principle as the method described by O'Connor and McDonald [this *Bulletin*, 1950, v. 47, 976] who succeeded in detecting the antigen of *Rickettsia tsutsugamushi* in the urine of patients suffering from tick-borne typhus as early as the first day of the illness by a haemagglutination-inhibition test. They used red blood cells sensitized by the polysaccharide antigen of *Proteus OXK*, which acted as an inhibitor of haemagglutination by the antibodies of mite-borne typhus in the same way as the present authors have found the corresponding antigen of *Pr. OX19* to inhibit haemagglutination by the antibodies of louse-borne typhus.

The present test has not been tried in actual cases of typhus fever but the authors claim that unless " the rickettsial antigens excreted by the kidneys from the blood to the urine are beyond the influence of some inhibitor " the method of sensitizing the red blood cells with patients' urine would constitute an easy, convenient and economical procedure for the detection of specific antigen in urine. *John W. D. Megaw*

Marmion, B. P., Stoker, M. G. P., Walker, C. B. V. & Carpenter, R. G. **Q Fever in Great Britain. Epidemiological Information from a Serological Survey of Healthy Adults in Kent and East Anglia.** *J. Hygiene.* 1956, Mar., v. 54, No. 1, 118–40, 1 fig. [20 refs.]

This is a detailed description of a serological survey of the distribution of the complement-fixing antibodies of Q fever among healthy adults in 2 areas in England. A comparison was made of the epidemiological information obtained from a group of Kentish and East Anglian blood donors having Q fever antibody with that of donors in the same areas

having no antibody. Variations in the prevalence of the antibody in groups of donors from different parts of the two areas are described and their significance is studied.

East Anglia consists of the counties of Norfolk, Suffolk, Cambridgeshire, Huntingdonshire, Bedfordshire, Hertfordshire and Essex.

Among 4,651 donors tested in various centres in Kent 186 (4·0 per cent.) had antibody at a titre of 1 in 10 or greater; it was possible to arrange for a personal interview with 137 of these and with 138 non-reactors from the same localities to serve as matched controls.

In East Anglia, 6,386 donors were tested; 163 (2·6 per cent.) of these reacted and 53 were interviewed with 68 matched controls from the non-reactors. The workers who carried out the interviews did not know which of the persons were reactors and which were non-reactors.

The most striking finding was that among the 137 reactors from Kent; 18 had direct occupational contact with farm animals or their products and only 4 of the 138 controls had contact of this kind. In a corresponding study of the same kind in East Anglia no significant relationship was found between the presence of antibodies and contact with animals.

In both Kent and East Anglia a significant association was found between the consumption of raw cows' milk and the occurrence of positive reactions. In Kent among the 137 reactors there were 41 who had been drinking only pasteurized milk during the previous 12 years, compared with 65 of the 138 non-reactors. In East Anglia 7 of the 53 reactors against 24 of the 68 non-reactors had drunk only pasteurized milk.

A history of previous illness of a kind which might have been Q fever was obtained from 43 per cent. of male reactors and in 25 per cent. of male non-reactors. The authors remark that "This difference is not statistically significant" and their view is corroborated by the fact that among the positive female donors 17·6 per cent. gave a history of such an illness and 25 per cent. of the negative reactors. In East Anglia there was no clear association between previous illness and antibody in either male or female donors.

There was no evidence that residence within a short distance of farms involved an increased risk of infection or that there was any association between infection and the keeping of cats, dogs, poultry or psittacine birds.

From a study of the information obtained from the complete sample of blood donors it appeared that, on the whole, the number of reactors tended to be higher in areas with a high density of sheep population per 100 acres of crops and grass land. In the table below, the average density of stocking with cattle, sheep and pigs for the 10 agricultural areas of Kent and the 7 counties of East Anglia is shown. Corresponding figures are given for Romney Marsh (in Kent) and the adjoining town of Rye (in Sussex); this area could not be included in the main part of the survey because blood donors were not available in the Romney Marsh. The figures referring to reactors in this area are based on tests of 100

volunteers from Romney Marsh and 91 blood donors from Rye and the surrounding country.

	Animals per 100 acres of crops and grass			
	Cattle	Sheep	Pigs	Percentage of human reactors
Kent	20	56	20	4·0
East Anglia	18	7	13	2·6
Romney Marsh and Rye	14	232	10	15·7

The density of population of sheep in the 10 " agricultural census areas " of Kent varied from 7 in the part of the country near London to 113 in one of the purely agricultural areas. In the counties of East Anglia the range was from 5 to 9 per 100 acres.

On the whole the areas in Kent most highly stocked with sheep had considerably higher percentages of reactors than the areas with relatively few sheep. The 2 areas with more than 100 sheep per 100 acres had 7·8 and 6·6 per cent. reactors, respectively, and the area with only 7 sheep per 100 acres had only 1·8 per cent. reactors. In the counties of East Anglia none of which had more than 9 sheep per 100 acres the highest percentage of reactors was 3·1.

In an Appendix one of the authors, R. G. Carpenter, deals with the problem of disentangling the relative weight to be attached to occupational contact and the drinking of raw milk as factors in causing infection. He describes the method adopted and states the statistical evidence on which the opinions already stated were based.

This paper, apart from the valuable epidemiological information which it contains, will be found very helpful by workers who contemplate the preparation of similar surveys in other areas. [For previous studies, see this *Bulletin*, 1953, v. 50, 501]. *John W. D. Megaw*

Erooga, M. A. & Shaw, J. B. **Rickettsial Pneumonia: Report of a Case.** *Tubercle.* 1956, Apr., v. 37, No. 2, 114–15, 2 figs.

An account of the first case of Q fever to be reported in South Bedfordshire [see also this *Bulletin*, 1954, v. 51, 907].

Zangaglia, O. & Ferrata, A. Rilievi clinici e considerazioni epidemiologiche sui primi casi di febbre Q osservati a Pavia. [**Clinical and Epidemiological Features of the First Cases of Q Fever seen in Pavia, Italy**] *Giorn. di Malattie Infettive e Parassit.* 1956, Apr., v. 8, No. 4, 138–45, 8 figs. [32 refs.]

Giroud, P., Roger, F. & Dumas, N. Comparaison des résultats obtenus avec *Rickettsia burneti* en microagglutination sur lame et en fixation du complément. [**A Comparison of the Results obtained in Tests for *Rickettsia burneti* by the Slide-Microagglutination and Complement-Fixation Methods**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 6, 800–803.

The authors regard Giroud's modification of the slide-microagglutination test originally introduced by Weigl for epidemic typhus as the only reliable agglutination test for Q fever; this and the complement-fixation test are the only uniformly specific and trustworthy methods of diagnosis.

For the slide-microagglutination test the antigen of choice is a suspension in saline of *R. burneti* obtained from the vitelline membrane of a yolk-sac culture. The same antigen is used for the complement-fixation test but the rickettsiae are washed to remove the anticomplementary elements associated with the liquid phase. Also it is essential that fixation should take place at a temperature of 37°C.; at 4°C. false positive reactions are liable to occur.

In infected rabbits the complement-fixation test gave later and less constant reactions than the microagglutination test. In a recent epidemic of Q fever 11 of 13 patients gave similar responses with both tests; the other 2 reacted only with the agglutination test. In the same epidemic there were 7 other persons who had been exposed to similar risks without developing symptoms of illness; none of these reacted with the fixation test but 4 were positive with the microagglutination test.

Several other observations are described in which the microagglutination test showed much greater sensitivity and duration than the fixation test; these differences were so pronounced that the authors believe that 2 distinct antibodies are concerned, one of which is agglutinating and the other complement-fixing. *John W. D. Megaw*

DENGUE AND ALLIED FEVERS

Hotta, S. & Evans, C. A. **Cultivation of Mouse-Adapted Dengue Virus (Type 1) in Rhesus Monkey Tissue Culture.** *J. Infect. Dis.* 1956, Jan.–Feb., v. 98, No. 1, 88–97, 8 figs. [11 refs.]

This is a description of experiments in the tissue cultivation of dengue virus (type I). The 2 strains employed had already been transferred through more than 100 mouse brains. In testicular tissue of rhesus monkeys one of the strains survived for at least 11 weeks but it showed no signs of having multiplied or of having caused damage to the tissue cells. In control experiments, in which inoculations were made on testicular tissues freed from cells, the virus disappeared in a few days.

In trypsin-treated kidney tissues of the rhesus monkeys both of the type I viruses multiplied, but at a slow rate compared with the rate of growth of poliomyelitis and other viruses; they were maintained for 31 and 10 passages respectively, retaining their infectivity for mice at high dilutions and being neutralized by specific immune rabbit serum. The infected kidney cells showed definite degenerative changes 1–3 weeks after inoculation, just at the time, or soon after, the virus concentration had reached its highest peak. These changes were suppressed by specific immune serum.

In view of the difficulty of isolating dengue virus by mouse inoculation the authors suggest that efforts should be made to isolate it by tissue culture. *John W. D. Megaw*

Nakagawa, Y. & Shingu, M. **Studies on Hemagglutination with Dengue Virus. I. Conditions and Properties of Hemagglutination.** *Kurume Med. J.* 1955, v. 2, No. 3, 157–66. [20 refs.]

"In this communication a report is made on hemagglutination with dengue virus (Hawaiian strain). And the results are summarized as follows:—

"The conditions of hemagglutination reaction: (1) A specific hemagglutinin was recovered from 2 to 4 day-old mouse brain infected with dengue virus. (2) The virus material was made into a 20% suspension with 5% glucose solution (pH 6·8) and further it was diluted two-fold in 1·5% $CaCl_2$ solution (pH 6·8) to obtain a 10% suspension. The suspension was centrifuged at 9,600 rpm for 10 minutes. The supernatant fluid was employed as the virus material. (3) 0·25% or 0·3% suspension of horse red cells and 1·5% $CaCl_2$ solution (pH 6·8) were used respectively as blood cells and reaction medium. (4) Optimal temperature for the reaction was 4°C.

"Specific properties of hemagglutination reaction: Hemagglutination reaction with dengue virus was inhibited by dengue hyper-immune mouse and rabbit sera, but not inhibited by anti-normal mouse, -normal rabbit, -mouse encephalitis (GD VII), -influenza (PR 8) rabbit sera, polio patient and normal human sera. Accordingly the hemagglutination with dengue virus is considered as specific."

RABIES

Nicol, C. G. **Human Rabies (Hydrophobia) in England and Wales. A Note on its History.** *Med. Officer.* 1956, May 11, v. 95, No. 19. 243–6.

Castagnoli, B., Orfei, Z. & Russo, G. Ricerche sulla durata dell' attività dei vaccini antirabici fenicati e formolati. [**Persistence of Activity of Phenolized and Formolized Anti-Rabies Vaccines**] *Rendiconti Istituto Superiore di Sanità*. Rome. 1955, v. 18, Pt. 12, 1339–47.

The English summary appended to the paper is as follows:—

"The authors studied the persistence of the immunizing activity of antirabies vaccines obtained by suspending 5 per cent. nervous tissue of dog in 1 per cent. phenicate [phenol] and in 0·5 per cent. formolate. They reached the conclusion that phenicate vaccines lose their immunizing effectiveness (tested on guinea-pigs) in three months from the date of preparation, while formolated vaccines lose it in shorter period of 80 days. The experimental results were confirmed statistically by the Chi-square test."

Stamm, D. D., Kissling, R. E. & Eidson, M. E. **Experimental Rabies Infection in Insectivorous Bats.** *J. Infect. Dis.* 1956, Jan.–Feb., v. 98, No. 1, 10–14. [13 refs.]

"Insectivorous bats were successfully maintained under laboratory conditions.

"These bats proved to be susceptible to preparations of rabies virus isolated from naturally infected bats and a wolf. Infection was produced by both intramuscular and intracerebral inoculation.

"Symptoms displayed consisted of loss of appetite, weakness, tremors, irritability, muscular spasms, paralysis, biting at the site of inoculation, and aggressiveness.

"The preparations of virus isolated from naturally infected bats had an unusually long incubation period in mice and an even longer incubation period in bats.

"Rabies virus was repeatedly recovered from the saliva of one bat during the two-week period preceding death of the animal.

"The implications of these findings are discussed."

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Davies, D. A. L. **A Specific Polysaccharide of** *Pasteurella pestis*. *Biochem. J.* 1956, May, v. 63, No. 1, 105–16, 5 figs. [49 refs.]

"1. Acetone-dried cells of *Pasteurella pestis* have been extracted with aqueous phenol (45%, w/v), after removal of proteins by saline extraction,

and a specific lipopolysaccharide has been obtained. This was purified by ethanol fractionation and ultracentrifuging.

" 2. The purified material is poorly soluble in water and insoluble in salt solutions. Analysis gave 1·6% N, 2·2% P; $[\alpha]_D^{20}$ was + 48°; relative viscosity at 1% (w/v) in water at 20° was 4·0.

" 3. Mild acid hydrolysis released in about equal amounts a chloroform-soluble phospholipid and a degraded polysaccharide having 1% N, 1% P, $[\alpha]_D^{20}$ + 58°.

" 4. The lipopolysaccharide is of very large particle size and sediments as one component in the analytical ultracentrifuge. The degraded polysaccharide has quite a low molecular weight, probably of the order of 10 000–15 000.

" 5. The lipopolysaccharide contains glucose, glucosamine and an unidentified aldoheptose sugar which composes the greater part of the polysaccharide moiety.

" 6. Immunological homogeneity was demonstrated by the agar-diffusion-precipitin technique.

" 7. The lipopolysaccharide is a hapten. It can be made antigenic by combination with the conjugated-protein component of the somatic antigen of *Shigella dysenteriae*. The degraded polysaccharide does not precipitate with specific polysaccharide antisera but inhibits the precipitation of the lipopolysaccharide with such sera.

" 8. The material can be extracted from rough and smooth strains, it is non-protective, relatively non-toxic, but strongly pyrogenic."

Crumpton, M. J. & Davies, D. A. L. **An Antigenic Analysis of *Pasteurella pestis* by Diffusion of Antigens and Antibodies in Agar.** *Proc. Roy. Soc.* Ser. B. 1956, Mar. 27, v. 145, No. 918, 109–34, 7 figs. on 4 pls. [54 refs.]

This is an important and very interesting study of the antigens and antibodies associated with various strains of *Pasteurella pestis* as revealed by the agar diffusion precipitin technique of Ouchterlony. The authors show that in addition to the envelope antigens, the toxin and the specific polysaccharide known to be produced by *P. pestis*, there are varying numbers of other distinct antigens (up to as many as 7) which can be shown by this technique to occur in different strains of the organism. The Tjiwidej strain has been shown to possess at least 10 lines of precipitation when tested against its homologous antiserum, and evidence is presented to show that the majority of these lines, possibly all of them, represent different antigens. The lines of precipitation are formed in the transparent agar medium lying between one pool containing a suspension of the strain of bacillus and another pool situated at a suitable distance away containing an antibody. Each line consists of the precipitate formed when the advancing front of an antigenic factor diffusing

through the agar medium encounters a corresponding front of antibody advancing from the pool of antibody.

By a study of these lines of precipitation in conjunction with animal experiments and electrophoretic analysis of antigens it has been possible to determine which lines of precipitation correspond to antigens having some special properties. For example, one line was found to represent the envelope antigen which protects mice from plague infection; another corresponded to plague toxin and yet another corresponded to an antigen characterized by containing a polysaccharide.

Some avirulent strains of *P. pestis* were found to be lacking in certain of these antigens; for example, one strain which does not protect mice and is non-toxic produces only 5 instead of the maximum number of 10 lines of precipitation. Three of the antigens are produced in most conspicuous form from *P. pestis* grown at 37°C., though the optimum rate of growth of the organism is at 28°C., and cultures grown at 20°C. develop only traces of these antigens.

It is impossible to find space for an adequate abstract of a paper which has 24 pages of text, each one of which deserves special notice; the exceptionally clear photographs, of which there are 4 pages, greatly facilitate the communication to the reader of a clear understanding of the text. There is a comprehensive summary of existing knowledge of the *P. pestis* antigens and a bibliography containing 54 references to the literature.

Workers on the bacteriology of plague must read this paper.

John W. D. Megaw

Cavanaugh, D. C., Wheeler, C. M., Suyemoto, W., Shimada, T. & Yamakawa, Y. **Studies on *Pasteurella pestis* in various Flea Species. I. Infection of Flea Species with Avirulent Strains of *Past. pestis*.** *J. Infect. Dis.* 1956, Jan.–Feb., v. 98, No. 1, 103–6, 2 figs.

The authors describe a fresh investigation of the classical studies of Bacot and Martin who in 1914 and 1915 [this *Bulletin*, 1915, v. 5, 392] produced evidence to show that blocking of the proventriculus of fleas by the clotting of plague-infected blood and the subsequent regurgitation of fragments of the infected clot into a fresh host by the flea in its efforts to obtain another blood meal played an important part in the transmission of plague.

The present authors reproduced the blockage of the proventriculus of *Xenopsylla cheopis* fleas by allowing them to feed on mice which had been inoculated subcutaneously 24 hours previously with a broth suspension of avirulent *Pasteurella pestis*. In similar experiments no blockage occurred in any of the *Monopsylla anisus* fleas that were employed, but in some of them "dark, free-floating masses were observed in the ventriculi". *P. pestis* was isolated from the blood clots found in some of the fleas of both species but attempts to transmit infection to mice by the bites of

the fleas gave negative results. This failure was attributed to the low degree of bacteriaemia which was always found in originally inoculated mice on which the fleas were fed. Attempts to increase the bacteriaemia by such methods as X-ray irradiation and administration of cortisone acetate were unsuccessful. *John W. D. Megaw*

Wheeler, C. M., Suyemoto, W., Cavanaugh, D. C., Shimada, T. & Yamakawa, Y. **Studies on *Pasteurella pestis* in various Flea Species. II. Simplified Method for the Experimental Infection of Fleas.** *J. Infect. Dis.* 1956, Jan.–Feb., v. 98, No. 1, 107–11, 1 fig.

In view of the failure, recorded in the preceding abstract, to transmit plague infection by the bites of fleas which had been infected by feeding on mice previously inoculated with large doses of avirulent *P. pestis* the authors devised a simple method of infecting the fleas *in vitro*. This was on the same lines as the method devised by Kartman [this *Bulletin*, 1955, v. 52, 360]. It consisted of a device by which the fleas were allowed to feed on infected defibrinated rabbit's blood through a membrane consisting of the skin of a small rodent. Full details of the procedure are given, including photographs of the apparatus employed.

The best results were obtained with *Xenopsylla cheopis* fleas which were allowed to feed overnight on blood heavily charged with *P. pestis*. In 9 batches of male and female fleas, comprising 698 in all, the average percentage of successful feedings was 40·8. The female fleas fed much more readily than the males, ingesting on the average 300 times as many organisms. The formation of proventricular masses associated with empty and constricted ventriculi was observed in some as early as the 3rd day, in others as late as the 9th day, after feeding. When the blocked fleas were allowed to feed on normal mice the masses might be broken up at once or might persist till two or more attempts had been made by the flea at daily intervals to swallow a further blood meal.

The engorged fleas were kept at 21–24°C. for 72 hours and then allowed to feed on a healthy mouse, but all attempts to transmit infection by the bites of artificially infected *X. cheopis* completely failed.

The apparatus described is claimed to be simpler and easier to manipulate than the one described by Kartman. [See also *ibid.*, 1955, v. 52, 534.] *John W. D. Megaw*

Quan, S. F., McManus, A. G. & Meyer, K. F. **Comparisons of Sulfisoxazole with Sulfadiazine, and Thiocymetin with Chloramphenicol, in Chemotherapy of Experimental Plague in Mice.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1028–36. [33 refs.]

Tests were done of the capacity of the 4 drugs named in the title to inhibit the growth of 10 strains of *P. pestis in vitro*. These were done

with an inoculum of 2 different sizes, one being very large, and the differences in results were so great that inhibitory concentrations are given in a table in mgm./ml. for the larger inoculum and μgm./ml. for the smaller (the operation of this factor is not discussed in the text, and the argument is based on findings with the larger inoculum). The order of descending activity *in vitro* was chloramphenicol, thiomycetin, sulfisoxazole, sulphadiazine.

Mice inoculated with 1000 or 10 LD 50 of *P. pestis* were given 100, 50, 25 or 12·5 mgm./kgm. of each drug, 1, 8 and 24 hours after inoculation. The percentages of survivors receiving the smaller inoculum (there were almost none after the larger) showed the descending order of therapeutic activity to be chloramphenicol, sulphadiazine, thiomycetin, sulfisoxazole. The relatively lower activity of the last two drugs *in vivo* is attributed to their more rapid excretion. *L. P. Garrod*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Chakravarti, H. S. & Mondal, A. **The Nature of Altered Renal Function in Cholera.** *J. Indian Med. Ass.* 1956, Mar. 16, v. 26, No. 6, 223–7, 1 fig.

In cholera there is a sudden and profuse loss of fluid and electrolytes within a very short time due to severe vomiting and diarrhoea. The concept of an acute renal failure arising from severe dehydration dates back more than 40 years when Rogers published his classical studies on cholera (*Cholera and its Treatment*, 1913, London).

The authors examined in 4 cases of cholera the kidney function from the beginning when they were admitted to hospital. Plasma and urine were examined daily for sodium, potassium, chlorine and urea, and the glomerular filtration rate, effective renal plasma flow and maximum tubular excretory mass were determined by observing the clearance of inulin and para-amino hippurate. Two types of reaction by the kidney were observed following the severe dehydration in cholera. In one there was a transient renal failure following the extreme fall of blood pressure and possibly due to a compensatory renal ischaemia. This was quickly reversed by proper fluid administration and restoration of circulation. The majority of cholera cases can be assumed to fall into this first category. In the second type of reaction the initial shock stage and the ischaemic process in the kidneys were obviously too long at work and the renal damage was not easily reversible. In some instances death will

result, in others recovery may be expected but it will be slow and the actual speed will depend on the degree of organic damage to the kidney.

H. Lehmann

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Susini, M. Quelques aspects cliniques de la dysenterie amibienne métropolitaine. [**Some Clinical Aspects of Amoebic Dysentery in Metropolitan France**] *Maroc Méd.* 1955, Apr., v. 34, No. 359, 474–5.

This is an account of amoebiasis as seen in Metropolitan France in those who have not contracted their infections overseas. The condition does not produce the manifestations usual to it in the tropics; but the author ascribes to it a variety of troubles, both in children and in adults, the true cause of which he considers commonly escapes recognition.

A. R. D. Adams

Isaacson, L. C. **Some Observations on Amoebiasis in the Coloured Population of Durban.** *South African Med. J.* 1956, Mar. 24, v. 30, No. 12, 292–4.

While amoebic dysentery and amoebic hepatitis are commonly of a fulminating type in the African population in Durban, amoebiasis assumes a much milder form in the white population in this area; in the " Coloured " (White/African) section of the community it is intermediate in severity. Twenty-four of the latter persons with amoebic dysentery and 11 with hepatic amoebiasis were seen during the first 6 months of 1955; that is 1 in 10 of this section of the population admitted to Addington Hospital during the period. Liver function tests, needle biopsies, and, where appropriate, aspiration of liver abscess contents, were done on these; also electrocardiograms were made before and after emetine treatment, and sigmoidoscopy and rectal biopsies were done. The records of some of the findings are set out in tables. The author concludes that the incidence of amoebiasis with symptoms and physical signs is high in the " Coloured " population; and that aspiration liver biopsy and liver function tests helped little in its diagnosis. Though electrocardiographic changes regularly followed 10-day courses of emetine treatment they merely indicated the desirability of confining the patients to bed; they

did not suggest any need to withhold this drug which has freely been given to a great many patients. *A. R. D. Adams*

Mackie, T. T., Mackie, J. W., Vaughn, C. M., Gleason, N. N., Greenberg, B. G., Nenninger, E. S., Lunde, M. N., Moore, L. L. A., Kluttz, J. A. & Taliafero, M. O. **Intestinal Parasitic Infections in Forsyth County, North Carolina. IV. Domestic Environmental Sanitation and the Prevalence of** *Entamoeba histolytica*. *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 29–39. [16 refs.]

Continuing their studies [this *Bulletin*, 1956, v. 53, 189] the authors turn their attention to the incidence of *Entamoeba histolytica* infection in individuals and in families in relation to their racial background and to their sanitary environment. Though the incidence of infection was found to be nearly twice as high in Negro families as in white, this was probably due to the inferior sanitary environment of the former. A direct relationship has already been shown by other workers to exist between the methods of disposal of excreta and general domestic cleanliness [this *Bulletin*, 1953, v. 50, 1042]. The results of the present detailed enquiries, which are set out in a series of tables, confirm that the prevalence of the parasite bears a significant relationship to the nature of the domestic water supply, the toilet facilities, and the methods of sewage and garbage disposal. As the level of these declines the incidence of the infection rises; among families with subminimal standards of sanitation the incidence was double that among families with the essential sanitary facilities. The results suggest that direct pollution and contact with contaminated objects, as well as fly transmission, play a part in the spread of amoebiasis. *A. R. D. Adams*

Mackie, T. T., Mackie, J. W., Vaughn, C. M., Gleason, N. N., Greenberg, B. G., Nenninger, E. S., Lunde, M. N., Moore, L. L. A., Kluttz, J. A. & Taliafero, M. O. **Intestinal Parasitic Infections in Forsyth County, North Carolina. V. Prevalences of Individual Parasites.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 40–52, 5 figs. [12 refs.]

Further analysing their findings the authors show in a series of tables the prevalence of sundry intestinal parasites, both helminthic and protozoal, in schoolchildren and their families in the area under survey. The observed incidence of *E. histolytica* infection in the schoolchildren was 6·1 per cent. Fifty-two per cent. of the children and 60 per cent. of the members of their families who harboured *E. histolytica* had one or more additional intestinal parasites. The incidence of these parasites in rural and in urban Negro and white subjects is set out in a table. The details should be sought in the original by those interested. *A. R. D. Adams*

Tilden, I. L. & Tanoue, R. **Amebic Granuloma probably arising in Cecal Diverticulum. Report of a Case.** *Arch. Pathology.* 1956, Apr., v. 61, No. 4, 314–17, 3 figs.

"An amebic granuloma of the cecum in a 33-year-old Japanese woman is described. The pathologic features suggest an origin in a cecal diverticulum and the history indicates that it may have originated nine years previously."

Trans. Roy. Soc. Trop. Med. & Hyg. 1956, Mar., v. 50, No. 2, 109–38. **Symposium on the Treatment of Human Amoebiasis. I. Treatment of Intestinal Amoebiasis** [Adams, A. R. D.]. 109–13. **II. The Treatment of Intestinal Amoebiasis with Emetine Bismuth Iodide, Glaucarubin, Dichloroacet-Hydroxy-Methylanilide, Camoform and Various Antibiotics** [Woodruff, A. W., Bell, S. & Schofield, F. D.]. 114–27. [12 refs.] Discussion 127–38 [McRobert, G.; Manson-Bahr, P.; Stamm, W. P.; Sachs, A.; Ridley, D. S.; Shortt, H. E.; Maegraith, B. G.; Wright, F. J.; MacFarlane, L. R. S.; Adams & Woodruff (in reply)].

Adams stressed the importance of the diagnosis of intestinal amoebiasis being confirmed by stool examination. Treatment is usually indicated only if the infection has been acquired outside Britain and is therefore more likely to be potentially pathogenic, or if it is associated with symptoms. For the uncomplicated case he advocates parenteral emetine for a few days until the acute symptoms are controlled and for eradication enteric-coated tablets of emetine bismuth iodide and oral iodo-oxyquinoline during a period of 3 weeks, the patient resting meanwhile. Not having had a disaster yet with Stovarsol, he still uses this drug and he also uses the now unpopular retention enemata of Chiniofon. His experience, lasting 30 years, is that these measures are successful in over 90 per cent. of infections. For the occasional resistant case, he advocates the use of an antibiotic (tetracycline or erythromycin) during the earlier days of a second course of treatment. Relapses after antibiotics alone and the dangers of subsequent resistant staphylococcal infections are cogent reasons for limiting their use as described.

Woodruff *et al.* reported on the results of therapeutic trials, comparing the newer drugs with oral emetine bismuth iodide [EBI] in a dose of 3 grains [0·2 gm.] nightly for 10 nights, preceded by a sedative. During the period of observation there was little risk of re-infection. All patients had suffered from dysentery or diarrhoea while abroad and were found to harbour trophozoites or cysts of *Entamoeba histolytica* in the stools. The majority had alimentary symptoms at the time of treatment. Both large and small races of parasites were treated similarly but recorded separately. Follow-up examinations were made one month after completing treatment and subsequently at monthly intervals, the average

number of repeat attendances being a little under 2 per patient. Of 64 treated by EBI alone 1 relapsed; of 156 treated by EBI followed by one or more other drugs, 5 relapsed.

Of 6 patients treated with chloramphenicol, only 1 appeared to be cured.

Six patients were treated with 2 gm. chlortetracycline (aureomycin) daily for 10 days; after 1 month cysts were found in 3.

Of 14 patients treated with oxytetracycline (terramycin) and followed up, 2 relapsed.

Toxic effects were noted in 11 out of 34 cases treated with Fumagillin. Of 27 cases followed, 2 failed to respond and one other relapsed. A patient whose infection had resisted EBI, chlortetracycline and oxytetracycline was apparently cured.

Of 12 patients treated with Camoform (Parke Davis & Co.), and followed up, 3 relapsed.

Glaucarubin (Merck-Sharp & Dohme Int.) was used on 76 patients in experimental doses, up to 10 mgm. per kgm. body weight daily for 10 days. Nausea was experienced by some patients receiving more than 8 mgm. per kgm. daily. Of 25 patients followed up, who had been given more than 4 mgm. per kgm., 3 relapsed.

Dichloroacet-4-hydroxy-n-methylanilide (Boots Pure Drug Co. Ltd.) [see below] was used experimentally in daily doses increasing to 21 mgm. per kgm. body weight for 10 days without side effects being observed; 2 of 17 patients treated with more than 12 mgm. per kgm. for 10 days relapsed. The authors note that it is expected that this drug and Glaucarubin will be cheap to produce. They conclude that emetine bismuth iodide is still the most satisfactory drug in the eradication of intestinal amoebiasis. [The subsequent discussion revealed general agreement with the pre-eminence of emetine bismuth iodide, and British opinion thus shows an important difference from American (see *Bull. of Hyg.*, 1956, v. 31, 478). The preparation of emetine bismuth iodide used is important. Gelatin capsules are used by the abstracter.]

In discussion McRobert noted that the high cost of emetine makes it prohibitive in certain needy rural areas. He also noted the limited follow-up reported by Woodruff *et al.* Stamm and McRobert disagreed with Adams in using retention enemata. Manson-Bahr expressed satisfaction that the value of emetine bismuth iodide was again being recognized [this *Bulletin*, 1945, v. 42, 207]. He referred to the variation in intensity of the invasive process in the bowel and he regarded the Bantu amoebic dysentery among Zulus in Durban as an extremely serious form due to a virulent strain of *E. histolytica*. Sachs recommended that patients should be warned to tolerate an unstable bowel for some months after treatment. Ridley referred to a modified formol-ether technique for concentrating cysts from stool specimens (*J. Clin. Path.*, 1956, in press). Wright referred to the effect of environment and bacterial infections in modifying the results of treatment. *Frederick J. Wright*

Bristow, N. W., Oxley, P., Williams, G. A. H. & Woolfe, G. **Entamide, a New Amoebicide: Preliminary Note.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Mar., v. 50, No. 2, 182.

The authors (from the Research Department of Boots Pure Drug Co., Nottingham) in their extensive search for new amoebicidal substances, noted high activity in a series of substituted acetanilides of the type 1, where R is hydrogen or halogen, R^1 is an alkyl group and R^2 indicates substitution in the phenyl ring by one or more halogens, hydroxy and other groups. Some members of the series showed very high activity in *in vitro* tests, in *in vivo–in vitro* and in *in vivo* tests. One of the most active was dichloracet-4-hydroxy-N-methylanilide, to which the name Entamide has been given. It was found to have a very low toxicity in acute toxicity tests and little toxicity after prolonged dosage of animals with large amounts daily.

The drug has undergone clinical trials in patients with amoebiasis and the results are published above. *H. J. O'D. Burke-Gaffney*

Sasaki, T., Yokogawa, M., Wykoff, D. E. & Ritchie, L. S. **Asymptomatic Amebiasis. Treatment with Atabrine in combination with Carbarsone or Chiniofon.** *U.S. Armed Forces Med. J.* 1956, Mar., v. 7, No. 3, 363–8. [16 refs.]

In view of the results obtained by Radke [this *Bulletin*, 1951, v. 48, 893 and subsequently] in the eradication of intestinal amoebiasis with mepacrine, the authors treated series of patients with asymptomatic amoebiasis with mepacrine and other drugs. The first patients tentatively were given mepacrine and carbarsone simultaneously for 7 days; the failure rate in cure was high (65 per cent.). A series of 40 patients was then given mepacrine, it was hoped, for 14 days and carbarsone [presumably concurrently] for 10 days; the failure rate was 25 per cent. but records of the exact dosages the patients received were mislaid. A second series of 17 patients was similarly treated and these took the drugs; all were considered to be sterilized of their infections. Another 22 patients had mepacrine for 14 days and Chiniofon [presumably by mouth] concurrently for 7 days; 3 were not sterilized of their infections. Yet another 10 were given mepacrine for 14 days and Chiniofon concurrently for 10 days; all but one were freed of their infections. The criterion of cure was examination of 3 to 5 stools within the 5 months following the treatment. The action of mepacrine and carbarsone in eradicating an intestinal amoebiasis the authors regard as effective. These drugs in combination were less effective against other intestinal amoebae, but *Giardia intestinalis* was eradicated by any of the last 4 treatments used. *A. R. D. Adams*

Nelson, R. S. **Hepatitis due to Carbarsone. Report of Two Cases.** *J. Amer. Med. Ass.* 1956, Mar. 3, v. 160, No. 9, 764–6, 2 figs. [Refs. in footnotes.]

Though Carbarsone has previously been reported to have produced hepatitis in 5 cases, one of them fatal [this *Bulletin*, 1936, v. 33, 543], it generally is considered to be the most innocuous of the arsenical amoebicides. The author records in some detail 2 further examples of hepatitis directly ascribable to the use of this drug.

The first, a woman of 22 years, with asymptomatic amoebiasis was given 0·25 gm. thrice daily; 10 days later she had fever and chills, anorexia and nausea, and the drug was stopped. The symptoms continued and she developed slight jaundice with enlargement of the liver within another day or so; under palliative treatment with intravenous dextrose for 5 days, the manifestations disappeared. After 2 weeks a needle biopsy of the liver yielded normal tissue.

The second, a male of 34 years, had amoebiasis with a history of diarrhoea during military service in Korea. He also was given 0·25 gm. Carbarsone thrice daily; on the seventh day he vomited and the drug was stopped. Three days later his urine was dark; in another couple of days there was jaundice and a generalized pruritus, with liver enlargement. The jaundice rapidly increased reaching its peak about a month after the drug had been stopped. Liver biopsy about 2 months after Carbarsone treatment had been started showed slight periportal infiltration, and pigment in the parenchymal cells, with small patchy areas of fibroblast activity suggesting a pericholangitis. The patient eventually left hospital fully recovered after 6 months.

In neither of these cases was there any histological evidence of a viral hepatitis, the liver function tests were consistently normal and the lymphocyte counts were normal. These individual patients presumably had a personal sensitivity to Carbarsone. While this drug has proved relatively non-toxic it is well not to be too complacent when prescribing it.

A. R. D. Adams

Nor El-Din, G. **The Use of Fumagillin in the Treatment of Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 67–71. [13 refs.]

Eleven patients with acute amoebic dysentery in Egypt were treated with 60 to 100 mgm. of fumagillin daily for 8 to 10 days; 5 of them failed to show any clinical or parasitic remission; the others, though temporarily relieved, later relapsed.

Another 6 comparable patients were similarly given fumagillin together with 4 gm. of neomycin daily for 8 days. All benefited temporarily, though their response was tardy, and 4 subsequently relapsed.

A final group of 6 similar patients was given 200 mgm. of fumagillin daily for 10 days. In each case there was a clinical and parasitic response

in 4 days' time, and the patients suffered no clinical or parasitic relapse over 2 months' observation. There were no side effects, and routine liver and kidney function tests revealed no toxic action of the drug.

In an addendum there is a report of the use of Fumidil, a proprietary antibiotic of similar structure, in the treatment of yet another 10 similar patients. The daily dose was 60 mgm. for 10 days; in all cases there was clinical and parasitic improvement within about a week.

The author concludes that fumagillin in 200 mgm. dosage produces symptomatic cure of acute amoebic dysentery but is less effective in doing so than is oxytetracycline or chlortetracycline. Fumidil proved more effective than did fumagillin, even when given in smaller dosage; possibly this was due to the fact that Fumidil had been stored in the ice chest and thus retained its potency, whereas the fumagillin had not been so kept and may have deteriorated. *A. R. D. Adams*

Nor El-Din, G. **Erythromycin in the Treatment of Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 72–5.

Fifteen adult patients suffering from acute amoebic dysentery were given erythromycin; 10 had 300 mgm. every 6 hours (1·2 gm. daily) for 10 days; the remainder had the same daily dosage for 5 days. In " almost all " cases there was marked clinical and parasitic response within 3 or 4 days, though of the 5 patients treated with the lesser dosage 2 relapsed within 10 days.

A patient with " acute dysentery due to a heavy infection with *Giardia intestinalis* ", which did not yield to atebrin [mepacrine] treatment, apparently was cured by erythromycin treatment. Another 2 infected with the same organism similarly responded.

In an addendum there is a brief reference to the promising results of the treatment of 6 patients suffering from acute amoebic dysentery with a new antibiotic, carbomycin. *A. R. D. Adams*

Scaffidi, V. Possibilità e limiti dell'impiego del cortisone nella terapia della epatite colliquativa amebica. [**Possibility and Limits of Cortisone Treatment in Amoebic Abscess of the Liver**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, Feb., v. 37, No. 2, 95–7.

The author gives an account of 3 cases of amoebic hepatitis (in only 1 of which was pus aspirated) treated with cortisone. Full clinical details are given in only 1 case where 6 cc. of pus was aspirated, the patient then being given 100 mgm. cortisone per day for 15 days. The fever fell by crisis, pains in the hypochondrium disappeared, and by the 11th day the enlarged liver returned to normal limits. After discharge from hospital the patient was given a cycle of chloroquine (gm. 15) but 2 months later developed amoebic dysentery which was controlled by emetine.

Of the remaining 2 patients, in one, after receiving cortisone (4 tablets of 25 mgm. each per day for 5 days), the temperature fell and the patient was then given emetine; in the other there was an immediate remission of temperature which persisted until the 5th day of chemotherapeutic treatment and did not return after the suspension of the cortisone (dosage as above) on the 6th day.

The author thinks that the addition of moderate doses of cortisone (100 mgm. daily for 5–10 days) to the usual emetine-chloroquine treatment will cause a more rapid cure of such cases. *W. K. Dunscombe*

Červa, L. Resistence cyst *Lamblia intestinalis* vůči zevním faktorům. [**The Effect of Disinfectants on Cysts of** *Giardia intestinalis*] *Československ. Parasit.* Prague. 1955, v. 2, 17–21. [12 refs.]

The English summary appended to the paper is as follows:—

"The efficacy of ten disinfectants on the cysts of *Lamblia intestinalis* was examined. Chlorseptol, Chloramin, sublimate Hydrargyrum oxycyanatum, Merfen, Rivanol, Ajatin and formalin in dilutions used for disinfection are insufficiently effective. Only phenol and lysol (liquor cresoli saponatus) in a strength from 2 to 5 in 100 proved to be acceptable for reliable and rapid disinfection. It was found that the cysts were highly sensitive to drying, but in water stayed alive for more than three months. The temperature of 50°C killed them immediately. The cysts bore refrigeration to −20°C for 10 hours. The epidemiological problems of lambliasis among the collectively brought-up children are discussed: direct transfer of cysts caused by the insufficient control of the cleanness of the boarders seems to be the main epidemiological factor."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Varma, M. G. R. **Comparative Studies on the Transmission of Two Strains of** *Spirochaeta duttoni* **by** *Ornithodoros moubata* **and of** *S. turicatae* **by** *O. turicata.* *Ann. Trop. Med. & Parasit.* 1956, Mar., v. 50, No. 1, 1–17. [24 refs.]

The author used 2 strains of *Spirochaeta duttoni*—the Wellcome strain isolated from a case of human relapsing fever, which was received in England from Professor Plaut in 1926 and has been maintained only in mice; and the Ifakara strain isolated in 1949 from *Ornithodorus* collected from African huts in Tanganyika, and maintained by tick-mouse-tick passage. In addition he used a strain of *S. turicatae* from Kenya maintained for the most part in its natural vector *O. turicata.* Three strains of *Ornithodorus moubata* were used, the laboratory strain, a colony of

" clean " ticks maintained since 1927 at the London School of Hygiene and Tropical Medicine; a Basel strain received from Professor Geigy; and the wild Mwanza strain from African huts in Mwanza, Tanganyika. The *O. turicata* strain comprised a batch of clean first-stage nymphs from Nairobi.

The clean nymphs of *O. moubata* after ingesting blood containing the Wellcome strain of *S. duttoni*, failed to transmit the infection in subsequent test feeds and also their coxal fluid was negative on microscopical examination and on inoculation into mice. Nevertheless spirochaetes persisted in some of the ticks for respectively 118 and 135 days after the infective meal, as proved by test inoculations. Spirochaetes were found in the salivary glands and coxal glands in a few of the ticks and the minimum time for such infection to develop was 8 days. Three successive infective feeds did not seem to increase the rate of infection and attempts to make the Wellcome strain transmissible by passage through ticks gave only inconclusive results.

A wild strain of *O. moubata* from Mwanza showed a higher rate of infection with the Wellcome strain of *S. duttoni*, but the results were not considered adequate to justify the view that different tick populations had different susceptibilities to infection.

When *O. moubata* were inoculated into the haemocoele with the Wellcome strain of *S. duttoni* they became infected and were able to transmit the spirochaetes when feeding; also the coxal fluid was infective. The organs of all the inoculated ticks contained spirochaetes which suggests that the gut well may act as a partial barrier to the passage of spirochaetes into the haemocoele.

The Ifakara strain of *S. duttoni*, on the contrary, was found to be much more infective to *O. moubata* than the Wellcome strain, and was transmitted naturally during feeding and spirochaetes were excreted in the coxal fluid. It is suggested that the difference between the 2 strains may be the result of their method of maintenance, the Wellcome entirely by mouse passage and the Ifakara by alternating passages in mice and ticks.

A comparison of the results obtained in tests for infection of *O. moubata* with Ifakara *S. duttoni* and of *O. turicata* with *S. turicatae* suggests that *O. turicata* may be a more efficient vector than *O. moubata*.

Edward Hindle

VARMA, M. G. R. **Infections of *Ornithodoros* Ticks with Relapsing Fever Spirochaetes, and the Mechanisms of their Transmission.** *Ann. Trop. Med. & Parasit.* 1956, Mar., v. 50, No. 1, 18–31. [60 refs.]

The author gives a useful review of the literature on the subject and then describes the results of his own experiments in which he used the same strains of spirochaetes and ticks as those in his previous paper [see above].

The haemolymph of 58 infected ticks was examined on the same day as the ticks were dissected. The results show that the microscopical examination of the haemolymph is not a reliable indication of organ infection as 12 out of the 58 ticks showed no spirochaetes in the haemolymph although their organs were positive. The apparent absence of spirochaetes may be due to their extreme rarity, but the author does not exclude the possibility of a granular stage, or even of a true negative condition of the haemolymph. When *S. turicatae* was inoculated into the haemocoele of *O. moubata* it invaded the organs, including the salivary glands and coxal glands.

A comparison of the organs of ticks infected with *S. duttoni* showed that the central ganglion was most frequently infected, followed in descending order by the coxal glands, salivary glands, reproductive organs, Géné's organ and the Malpighian tubules. *S. duttoni* infected the central ganglion more frequently than *S. turicatae*; and the frequency of infection of the ovaries of *O. moubata* with *S. duttoni* was higher than that of the ovaries of *O. turicata* infected with *S. turicatae*. There was no significant difference in the infection of the ovary and testes in *O. moubata* and *O. turicata*, infected in various ways with 2 strains of *S. duttoni* and one of *S. turicatae*. In all cases Géné's organ and the Malpighian tubules were only lightly infiltrated.

Five out of 10 adult *O. moubata* inoculated with *S. duttoni* showed heavy infection of the salivary gland, while only 4 out of 23 adults were positive when infected as nymphs by feeding. The transmission is stated to be mainly by the inoculation of infected saliva into the tick's bite, although in the case of *O. moubata* the coxal fluid may play a subsidiary role. Nymphs and young adults were found to transmit the infection more readily than old adults, and the latter did not always produce infection even when subsequently proved infective after dissection.

The coxal fluid of *O. turicata* infected with *S. turicatae* was negative both microscopically and by inoculation into animals and transmission is entirely by bite. It was found, however, that the coxal glands of 9 out of 10 *O. turicata* inoculated intrahaemocoelically with *S. turicatae* contained spirochaetes. *Edward Hindle*

Colas-Belcour, J. & Vervent, G. Transmission de divers spirochètes de la fièvre récurrente par une souche soudanaise de l'*Ornithodoros erraticus* Lucas (= *O.e.* var. *sonrai* J. Sautet, H. Marneffe et M. Witkowsky 1944). [**The Transmission of Various Relapsing Fever Spirochaetes by a Soudanese Strain of** *Ornithodorus erraticus* (*O.e.* **var.** *sonrai*)] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 747–57. [35 refs.]

The authors used an uninfected strain of *Ornithodorus erraticus* var. *sonrai* found in the burrow of a palm rat at Gao, French Sudan, by Sautet, Marneffe and Witkowsky in 1943 and subsequently maintained

in the laboratory. This strain of ticks is difficult to rear, for the different stages, and especially the first stage nymphs, had to be fed at 28°C. before they would become properly engorged.

The ticks were fed on mice infected with various strains of spirochaetes, and also on a guineapig infected with *Spirochaeta hispanica*, and tested subsequently for infectivity. A strain of *S. crocidurae* isolated from *O. erraticus* in Dakar, was readily transmitted by the Gao ticks, and in addition the infection was transmitted through the ovary. Transmission was also obtained with a strain of *S. merioncsi*, about 24 per cent. of the ticks becoming infected. With the same strain of ticks, transmission experiments with a Persian strain of *S. microti*, an Egyptian strain of the same species, a Moroccan strain of *S. hispanica*, and a Congo strain of *S. duttoni* gave uniformly negative results. *Edward Hindle*

YAWS AND OTHER TREPONEMATOSES

Klokke, A. H. **Comparison of Repository Penicillin Treatment Schedules in Yaws in Indonesia. An Evaluation of the Epidemiological and Economical Conditions that influence this Comparison.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, Mar., v. 8, No. 1, 1–12, 2 maps & 5 graphs.

This is the record of a well conducted investigation in the field. The author stresses the limitations imposed on such work by lack of cooperation by the patients. From mapping of the area under consideration according to geographical features and economic status it is evident that yaws is more prevalent in the less favoured areas. Attention was paid to the clinical features and the sero-positive titres. In considering the state before treatment by penicillin allowance should be made for the effects of previous arsenical therapy. Four different treatment schedules of repository penicillin (PAM) were attempted in 4 different areas. For adults the dosage was either a single injection of 4 ml. or 6 ml. or 2 injections of either 4 ml. and 2 ml. at intervals of 7 or 5 days. No conclusions could be drawn from the latter 2 schedules as the people did not cooperate sufficiently.

The patients of the more favoured North Tjawas area, showing a slightly lower incidence of yaws, were given 6 ml. and those of the less favoured South Tjawas area 4 ml. After an interval of 6½–8 months the relapse rate was 2·4 per cent. (North) and 3 per cent. (South).

The percentage of sero-negatives found during re-surveys and the mean decrease in titre were greater in the North than the South. Although the groups were not strictly comparable it appears that the use of 6 ml.

gives somewhat better results than 4 ml. Reinfections from untreated cases could not be excluded. [See also this *Bulletin*, 1953, v. 50, 775.]

Frederick J. Wright

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Kooij, R. **The Value of the Histological Criterion for the Classification of Leprosy. A Study of Reports by Several Examiners of the Same Histological Preparations.** *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 301–6.

With a view to testing to what extent histological examination can be depended upon in the classification of leprosy, skin sections from 45 leprosy patients were sent to 7 different pathologists for reports. Of these 45 cases 9 were diagnosed clinically as lepromatous, 18 as borderline, and 18 as tuberculoid. There were 33 reports on the 9 lepromatous patients, but only 12 of these diagnosed the lepromatous form; 8 being tuberculoid and 7 nonspecific. From the 18 borderline cases there were 87 reports, which gave 18 lepromatous, 21 tuberculoid and 22 nonspecific. For the tuberculoid specimens there were 77 reports, 37 giving tuberculoid, 22 nonspecific and 2 lepromatous. It is concluded: (1) that different cases of the same type or group may show different histological pictures; (2) that investigators differed in their opinions on the same section; (3) that one cannot exclude the diagnosis of leprosy on finding a nonspecific histological picture; (4) that when the histological picture is not in agreement with the classification based on other criteria, one does not necessarily have to change the classification; (5) that agreement of the histology with the clinical criteria of a definite type or group of leprosy gives support, and should be helpful in doubtful cases.

Ernest Muir

Dastur, D. K. **The Motor Unit in Leprous Neuritis. A Clinico-Pathological Study.** *Neurology.* Bombay. 1956, Jan.–Mar., v. 4, No. 1, 1–27, 43 figs. [79 refs.]

Study of the literature leads the author to the conclusion that leprous neuritis is an ill-studied problem, though perhaps the commonest cause of muscle disorder in India. He studies: (1) the clinical features of sensory and motor loss, (2) terminal innervation of muscle by intravital staining, (3) changes in voluntary muscles, and (4) various "neuropathies". From 69 leprous patients 75 muscle biopsies were obtained,

the *flexor carpi ulnaris* being chiefly used. A portion of an ulnar nerve was obtained at necropsy. Clinical study showed that "the zone of sensory loss was generally well defined and roughly corresponded to the anaesthetic areas resulting from peripheral nerve injuries".

The pathological changes found in the muscles were: reduction of the over-all density or even loss of innervation, beading or fragmentation of the nerve fibres, shrinkage of end-plates, prominence of Schwann nuclei, and proliferation of endoneurium and perineurium. Along with these signs of degeneration there were regenerative signs such as collateral branching and formation of growth cones and end-plates. In some cases there were signs of inflammatory myositis. Rarely acid-fast bacilli were found in intramuscular nerve twigs or connective tissue. There was evidence that muscular atrophy and degeneration of end-plates preceded changes in motor nerve fibres, and the neuritic process was slow, giving time for diagnosis and treatment. The role of anatomical and mechanical forces in determining the degree of disease in infected nerves is discussed, as are also the effects of pressure and ischaemia in causing first blocking and then progression to necrosis.

[There is much valuable information in this paper which should be read in the original.] *Ernest Muir*

Schujman, S. **The Use of Dilute Antigens in Lepromin Tests.** *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 291–4. 6 figs. on pl.

With a group of 40 cases of tuberculoid leprosy, 28 of them strong reactors to lepromin and 12 weak reactors, simultaneous lepromin tests were made with diluted and undiluted antigens. With the integral original antigen the strengths were 1 in 20, 1 in 100, and 1 in 750; with Dharmendra's bacillary antigen they were 1 in 1000 and 1 in 5000. It was found that with strong reactors the reactions were similar but a little less intense with the more dilute antigens, but with the weaker reactors there were often no reactions with the weaker dilutions. It is recommended that weak dilutions should be used only in patients who have already been found to be strong reactors. *Ernest Muir*

Floch, H. **Enhancement of Positivity of the Mitsuda Reaction obtained with Diluted Antigen.** *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 295–300, 1 fig.

Because of the difficulty in obtaining sufficient suitable material for preparing lepromin antigen, a 1 in 750 dilution was used. To enhance the strength of the reaction 12 per cent. glycerin and 2 per cent. paraffin were added to the diluted antigen. In 114 cases this addition increased the strength of the reaction in 50 per cent., and it was less in only 9

instances. A 50:50 mixture of a 1 in 375 diluted antigen with a 1 in 20 normal skin suspension gave stronger results in 76 per cent. of 79 positive reactions. *Ernest Muir*

Fernandez, J. M. M. **Influence of the Tuberculosis Factor on the Clinical and Immunological Evolution of Child Contacts with Leprosy Patients.** *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 243–58. [25 refs.]

The clinical and immunological evolution is described of 83 children who had lived in contact with open, lepromatous patients, and whose exposure to infection was therefore indubitable. These were of ages varying from 1 month to 15 years when first seen. For purposes of comparison they were divided into 3 groups: (1) a group of 28 (tuberculin reactivity immaterial) who had been vaccinated with BCG (mostly at birth), 22 of them by injection and 6 orally; (2) a group of 32, tuberculin positive, who were not vaccinated with BCG; (3) a group of 23, tuberculin negative, who were not vaccinated with BCG.

Of the first group 9 subsequently developed leprosy, 8 of these being tuberculoid and 1 indeterminate. In the second group 13 developed leprosy, all but one indeterminate case being tuberculoid. In the third group 10 developed leprosy, 5 being tuberculoid, 2 indeterminate, and 3 lepromatous. The significant factor is the presence of the lepromatous cases in the third (tuberculin-negative group), and their absence in the tuberculin-positive group. There is also a marked relationship between the positive Mitsuda reaction and the positive tuberculin reaction in the first 2 groups.

The author concludes that if BCG is effective in the prevention of leprosy, and if vaccination by mouth is innocuous, he would advise mass oral vaccination of the people in an endemic area, but failing this priority should be given to lepromin-negative contacts with open leprosy.

Ernest Muir

Ignácio, J. L., Palafox, Clarina A. & José, F. A., Jr. **Mitsuda Reactions induced by Repeated Lepromin Testing in Children removed at Birth from their Leprous Parents. Failure of BCG to induce Strong Reactivity in Persistently Moderate Reactors.** *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 259–69. [15 refs.]

Fifty small children of leprous parents in the Culion Leprosarium had, with 1 exception, been separated from their parents at birth, the exception being a child who had been exposed to contact with his mother for some hours. The lepromin reaction was tested 4 times, twice in 1949 and twice in 1950. A fifth test was made in 1951, but only in 32 of the children. A final test was made in December 1951, about 2¼ years after

the first trial, in the 47 children still available. In the first test only 22 per cent. were positive; in the third test 96 per cent. reacted; in the fourth all reacted, many of them reacting intensely although less than a year old. After the sixth lepromin test there remained 12 children whose reaction had not passed the 2+ grade. Ten of these who had negative tuberculin reactions were vaccinated with BCG in April and July 1952, by the multiple puncture technique. When the lepromin test was done a seventh time 2 months later the reaction had not increased from 2+ in any of the 10 children. *Ernest Muir*

Prieto Lorenzo, A. Tratamiento de la leprorreacción por el ACTH y Cortisona. [**Treatment of Lepra Reaction with Corticotrophin and Cortisone**] *Med. Colonial.* Madrid. 1956, Mar. 1, v. 27, No. 3, 227–50, 7 graphs. [20 refs.]

After describing the nature and symptoms of lepra reaction, the author quotes the experiences of other workers with regard to the effects of corticotrophin and cortisone. He relates the effects of these hormones in controlling the various symptoms of lepra reaction, including the dramatic fall in temperature, subsidence of congestion of the skin and mucous membranes, in 25 of his own patients. The author gives corticotrophin intramuscularly as follows: 15 mgm. on the first day, 10 mgm. on the second and third and 5 mgm. daily for the next 3 or 4 days. In some cases, a dose of 5 mgm. was not exceeded. He uses cortisone orally in the following dosage: 200 mgm. on the first day, 150 on the second, 100 on the third, 75 on the fourth and 50 on and after the fifth. He does not prolong it for more than 15 days. In 60 per cent. of cases there was a fall of temperature within 4 hours and in about 100 per cent. by the second day, showing that the preparation was of good quality, that the suprarenal cortex was responding well, and that the dose was adequate. Seven of the cases are illustrated with temperature charts. Neural symptoms do not always clear up satisfactorily, and vitamins B1 and B12 in large doses should be used to supplement the hormone treatment. *Ernest Muir*

Garrett, A. S. **Hyalase (Hyaluronidase) Injection for Lepromatous Nerve Reactions.** *Leprosy Review.* 1956, Apr., v. 27, No. 2, 61–3.

Patients were chosen with severe and frequently repeated nerve reactions. Intraneural injections were given of 5 to 6 ml. of a solution of 3 mgm. of hyalase in 20 ml. of 2 per cent. procaine at weekly intervals, 5 injections being given into each nerve. At first patients with 2 affected nerves were chosen, the more affected nerve being injected and the less affected kept as a control; but it was not found possible to deny the

patient the relief in the untreated nerve which he had experienced in the treated one. Case histories are given of 4 patients out of 24, nearly all of whom showed uniform improvement. Six others are also reported in whom there was failure or only partial success. The author is of the opinion that " this treatment holds out better hope for those suffering from nerve reactions than any treatment so far used ". However, he does not use it if caseation is suspected " as the probable result would be a spread of the area destroyed by caseation ". *Ernest Muir*

GARRETT, A. S. **Five Years of Mass Dapsone (DDS) Treatment.** *Leprosy Review.* 1956, Apr., v. 27, No. 2, 54–60.

In 1951, when dapsone treatment of leprosy had been in use for a year, the number under treatment in the Onitsha Province of Nigeria reached 10,600. Since then there has been a steady decrease in numbers to 7,800 at present, and the severer types are seldom seen except when new areas are opened up. Except for a few which were complicated by dermatitis, all nodular lepromatous cases have improved, and most of the severest cases whose treatment began in 1950 " are now mostly reaching the stage of negative smears ". Addition of isoniazid to sulphone treatment did not much accelerate progress, but reaction seemed less. Dermatitis with associated hepatitis occurs in about 2 per cent., but " Nearly all are fairly easily desensitised by a course of sulphetrone mixture starting with 1/80 gram. of sulphetrone ". Also in these patients thiacetazone may be used, but this loses its effect in about 2 years. Hepatitis, which was at first much feared, is now recognized to be largely the result of previous undernourishment. When sulphone treatment first started there were many severe lepromatous cases and reactions were severe and common; now new patients are at an earlier stage and reactions are less common and less severe.

" No definite case of Dapsone resistance has yet been shown by us but we have a few cases which lead us to suspect its development. One lepromatous patient has shown slow but steady improvement over five years of Sulphetrone and Dapsone treatment, but in the last two smear results there is a slight rise again. No clinical deterioration is shown and the bacteriological index is still well below that at the start of treatment. A few tuberculoid patients remain with active-looking lesions for four or more years. These cases must be watched and if drug-resistance is confirmed it will be reported." Relapses occurred in about 7 per cent. in: (a) those treated with hydnocarpus followed by only a year or less of dapsone treatment, (b) some atypical tuberculoid cases given only 18 months' treatment with dapsone, (c) those attending irregularly owing to laziness or personal difficulties. The dangers and advantages of injections of dapsone as against tablets are weighed up, but the author's preference is for tablets. The real danger lies in the

patient who can conceal his disease by treatment which is insufficient to render him uninfective.

[This paper is full of useful practical points, and should be carefully studied by all who treat leprosy patients.] *Ernest Muir*

Leprosy Review. 1956, Apr., v. 27, No. 2, 67–9. **The Makogai Sandwich.** [Extract from letter to Colonial Office from the Director of Medical Services, Suva, Fiji, dated 2.11.55.]

The "Makogai Sandwich" is a device for ensuring that patients discharged, with disease arrested, from the Makogai Leprosarium continue their treatment regularly for the required time. It consists of 10 DDS tablets made up with the patient's name, address and serial number. The patient is told to take the sandwich away and to poke a stick through one hole on Sunday and Wednesday of each week and swallow the tablet which comes out. When the sandwich is finished he has to return for examination. This process is continued for 3 years from the date of discharge. It is proposed to follow this up by the examination of all contacts in the families of the patients over a lengthy period.

Ernest Muir

Browne, S. G. **Oral "Sulfon-Cilag" in the Treatment of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 284–90.

This is an account of the results of treatment with Sulfon-Cilag of 67 patients, the types of disease being 57 lepromatous, 9 tuberculoid and 1 indeterminate. Chemically, it is the sodium salt of 4-carboxymethyl-amino-4′-aminodiphenyl sulphone, and it is freely soluble in water. It was administered in tablet form, the dose being 200 mgm. thrice a week, but varied with the size and condition of the patient. Later, doses of 100 to 200 mgm. were given daily; after 3 weeks, a rest was allowed. The results are shown in tabular form after 12 to over 36 weeks' duration of treatment. All the tuberculoid cases progressed towards complete healing. "Lepromatous cases showed, in the main, both clinical and bacteriological improvement during the period of treatment. . . . It suggests that if therapy could be continued for longer than was possible in the cases under review, it would result in both bacteriological and clinical amelioration." *Ernest Muir*

Amendola, F. **Ocular and Otorhinolaryngological Leprosy before and since Sulfone Therapy.** *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 280–83.

The author describes the profound difference in eyes, nose and throat complications of leprosy since the introduction of sulphone therapy.

Formerly PINKERTON, writing of the Hawaiian Islands, said: " All leprosy patients sooner or later are affected with ocular complications ". To the specialist the incipient invasion of the episclera always heralded " frank lepromatous involvement and certain blindness ". With sulphone treatment, leprosy of the eye is now limited to invasion which occurred before sulphone therapy was begun. Surgery of the eye in patients treated with sulphones offers a better chance of restoring the transparent media.

In the State of São Paulo, Brazil, 235 tracheotomies were performed for lepromatous obstruction of the air passages between 1933 and 1948; between then and 1955 none have been necessary. *Ernest Muir*

CHAUSSINAND, R. A propos de l'experimentation de la vaccination par le BCG dans la prophylaxie de la lèpre. [**Experimental Vaccination with BCG in the Prophylaxis of Leprosy**] *Internat. J. Leprosy.* New Orleans. 1955, July–Sept., v. 23, No. 3, 270–79.

In order to test the effect of BCG vaccination in the prophylaxis of leprosy two methods may be used: (1) oral vaccination of 50 per cent. of all new-born children, the remaining 50 per cent. being used as controls, and the vaccinated and controls being comparable as regards age and sex; (2) In the case only of those non-reactive to lepromin and to heat-killed virulent *Myco. tuberculosis*, vaccination would be made intradermally with BCG. While important results might be obtained by the former method, the latter is preferable, as those affected by *Myco. tuberculosis* and most of those affected by *Myco. leprae* would be eliminated. In order still more to eliminate those previously affected by the latter bacillus, only infections (except those in the new-born) that appeared more than 3 years after the beginning of the experiment should be taken into account. It is also regarded as likely that intradermal administration of BCG would be more effective than oral because the leprosy bacillus has a particular affinity for the skin; and this is confirmed by experiments in guineapigs, where with equal doses of BCG the intradermal route gave rise to more marked reactivity to lepromin than intraperitoneal vaccination. Detailed statistical analysis of the results would be made. *Ernest Muir*

ROSS, C. M. **Leprosy Control in Northern Nigeria.** *Leprosy Review.* 1956, Apr., v. 27, No. 2, 64–6.

A pilot scheme of out-patient clinics attached to a Sleeping Sickness Dispensary in Northern Nigeria was begun to find out the response of the population to treatment available within reach of the villages, the incidence of leprosy in the district, and a dosage of dapsone [DDS] suitable for out-patient treatment given by a dispensary attendant with

minimum supervision from a medical officer. Soon hundreds of patients appeared, some walking more than 10 miles. In less than a year there was a response incidence from 5 of the largest villages of between 7·6 and 4·8 per cent. During the first 6 months there were few lepromatous patients, but they came forward as the clinics became popular.

The dosage of dapsone used in the tuberculoid type rose gradually from 1 to 4 tablets of 100 mgm. given once a week during a period of 18 months. In the lepromatous type it rose more slowly from one-half to 4 tablets during a period of 30 weeks. In each case raising of the dose was delayed if there were signs of intolerance. It was found in the early stages of treatment of severe lepromatous cases that half a tablet was effective, and that a rapid increase of dosage gave rise to erythema nodosum and other adverse symptoms.

In 1955 approximately 540 patients were discharged after 2 years and 9 months of treatment, 40 per cent. of these being children who had been admitted with 1 or 2 tuberculoid patches. An encouraging feature shown after a survey was that no new highly infective lepromatous patients were found who had not already registered for treatment at the clinic. It was found that all leprosy patients could be treated successfully by a careful use of dapsone, and that weekly doses of 50 mgm. could be given with good results in leprosy patients with persistent leprosy fever.

Ernest Muir

Naguib, M. & Robson, J. M. **The Activity of Diethyldithiolisophthalate alone and combined with Isoniazid in the Treatment of Murine Leprosy in the Mouse Cornea.** *Lancet.* 1956, Apr. 14, 411–12, 2 figs.

Diethyldithiolisophthalate belongs to a class of compound known to have an action on tuberculosis: this paper reports experiments designed to determine whether it has an action on leprosy. Mice were inoculated intracorneally with a suspension of *Myco. leprae murium*, so producing a lesion the progress of which could be observed, and treated with this drug, with isoniazid or both. Each drug was given orally, the former in doses of 5 mgm. at 2- or 7-day intervals, and isoniazid in a daily dose of 0·3 mgm. Both drugs reduced the rate of development of the lesions, but complete arrest of their development for 22 weeks was achieved by giving both when diethyldithiolisophthalate was administered at 2-day intervals: when the 7-day interval for this drug was used in combined treatment the progress of the infection was still very slow.

L. P. Garrod

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

CAMBOURNAC, F. J. C., GÂNDARA, A. F. & PENA, A. J. Inquérito sobre bilharziose vesical e parasitoses intestinais nas áreas administrativas de Cuchi, Menonge e Longa (Angola). [**Survey of Urinary Schistosomiasis and Intestinal Parasites in the Cuchi, Menonge and Longa Areas, Angola**] *Anais Inst. Med. Trop.* Lisbon. 1955, Dec., v. 12, No. 4, 549–74, 4 maps (2 folding), 2 figs. & 5 graphs. [12 refs.]

The English summary appended to the paper is as follows:—

"In a Southern region of Angola which covers the areas of the three administrative posts of Cuchi, Menonge, and Longa, 739 natives of all ages were observed belonging principally to the Quiôcos and Ganguelas tribes with a view to a better knowledge of the incidence of bilharziasis and intestinal parasitosis.

"A percentage of 32·4 natives were found with bilharziasis and the respective values are mentioned in relation to the three regions observed, to the sex, and to the dominant tribes.

"The remarkable dissimilarity of the rates of the incidence of this disease in two contiguous zones is pointed out.

"In the examinations for intestinal parasitosis, hookworm disease, with a total infestation of 44·1 per cent, was found to be the most important one. Amoebiasis, however far from this result, comes after with a percentage of 3·5. The different results found are reported similarly in relation to the ages, sex, tribal divisions, in the three regions investigated.

"Some of the results of the blood examinations performed in three groups of natives are mentioned also as follows: a group with bilharziasis without hookworm disease, another with hookworm disease without bilharziasis, and a third group with both the parasitosis."

AL ZAHAWI, S. & SHUKRI, N. **Histopathology of Fatal Myocarditis due to Ectopic Schistosomiasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Mar., v. 50, No. 2, 166–8, 4 figs. on 2 pls. [16 refs.]

At the Central Pathology Institute in Baghdad it has been observed from surgical biopsies and necropsies that the lesions due to *Schistosoma haematobium* infection fall into one or other of 2 clear groups—inflammatory and cellular proliferative. The inflammatory lesions are seen in urinary fistulae, with or without incrustation of the bladder, and occasionally in intestinal lesions simulating amoebic ulcers. The proliferative are characterized by tumour formation; which may be

benign in the form of urinary or intestinal polyps, and less commonly papillomata in the inguinal region; in such growths malignancy may develop in time.

The present patient was a boy of 13 years who entered hospital gravely ill with a cough and orthopnoea, cyanosis, jugular congestion, an enlarged heart with a mitral systolic murmur, emphysema and bronchitis, enlargement and tenderness of the liver, splenic enlargement, ascites and oedema. The urine contained albumin, many cells, blood, and granular and hyaline casts, but no ova. He died within 16 hours. At autopsy the right heart was found to be dilated, there were isolated necrotic foci in the left myocardium, numerous small nodules under the pleura, slight portal fibrosis, enlargement and cortical oedema of the kidneys, with bilateral pyelitis and dilated ureters. The fibro-sclerotic bladder was heavily charged with *S. haematobium* eggs. Eggs were found in the myocardium where there were perivascular changes, congestion and eosinophilic infiltration. The heart failure was considered to result from the schistosomal lesions in the myocardium. *A. R. D. Adams*

Maclean, G. **An Experiment in the Control of Schistosomiasis: Second Report.** *Ann. Trop. Med. & Parasit.* 1956, Mar., v. 50, No. 1, 81–4.

The author has already detailed the results of initial surveys and treatment of *Schistosoma haematobium* infection in Likoma, an island in Lake Nyasa [this *Bulletin*, 1954, v. 51, 951]. He continues the record here. Health education has had little influence on control of the infection and the sanitary discipline is poor; constant snail control is necessary and it has not proved possible to attempt the complete eradication of snails from the shore by poisoning. Annual surveys of the population have continued and suspected or proven cases have been treated with Nilodin (lucanthone) or antimony; there has been a considerable apparent reduction in the infection rate. Nilodin treatment apparently achieved an 85 per cent. recovery rate; those who do not respond to it should be treated with trivalent sodium antimony gluconate. [In the text of the paper sodium antimony tartrate is mentioned, but the author writes to say that he intended to indicate that treatment should be given by trivalent sodium antimony gluconate.] Much can be done towards control by freeing selected watering and bathing areas from infection and by the issue of protective clothing to those under special risk, as well as by health education, mass treatment and snail control within the limits that the population and their environment allow.

A. R. D. Adams

Robinson, D. L. H. **A Routine Method for the Maintenance of *Schistosoma mansoni in vitro*.** *J. Helminthology.* 1956, v. 29, No. 4, 193–202, 1 fig.

The technique of sterilization and assembly of an apparatus [this *Bulletin*, 1955, v. 52, 1102] designed for the maintenance of *Schistosoma*

mansoni in vitro is described in detail. A method is given of removal of living schistosomes, under aseptic conditions, from the portal vein of infected hamsters and their transference to the observation chamber of the apparatus.

A culture medium of equal volumes of horse serum and Tyrode solution was found unsatisfactory and not as good as horse serum alone. The addition of small quantities of haemoglobin to the serum made no improvement, but the inclusion of 0·1 per cent. glucose greatly increased the activity of the worms. Normal human serum was of about the same value as horse serum.

The worms were seen to copulate and produced ova under *in vitro* conditions. The condition of the ova was not observed. Small increases of temperature above 37°C. usually killed the worms but reduction of temperature as low as 20°C. for 12 hours had no harmful effect. Slight variation in *p*H of the medium was of no importance.

Estimations of the glycogen content of schistosomes freshly removed from the host and that of worms after maintenance in culture up to 14 days showed no significant difference. It is concluded that the general activity, frequency of copulation, oviposition and retention of carbohydrate reserves suggests that the schistosomes are living a reasonably normal life under *in vitro* conditions. *O. D. Standen*

VON BRAND, T., MCMAHON, Patricia & NOLAN, M. O. **Observations on the Postanaerobic Metabolism of some Fresh-Water Snails.** Reprinted from *Physiol. Zoöl.* 1955. Jan., v. 28, No. 1, 35–40. [10 refs.]

FRAGA DE AZEVEDO, J. & DE MEDEIROS, Lídia do C. M. Estudos, ensaios e documentos. XIV. Os moluscos de água doce do Ultramar Português. I. Introdução. Generalidades. [**The Freshwater Molluscs of Portuguese Territories Overseas. General Introduction**] 95 pp., numerous illustrations. 1955. Lisbon: Junta das Missões Geográficas e de Investigações do Ultramar, Palácio da Junqueira, Portugal.

For many years medical entomology and parasitology have made steady advances, while the study of molluscs as carriers of disease has remained almost static. Recently a great awakening of interest in economic malacology has resulted in a number of contributions to our knowledge of the subject. "*Os Moluscos de Água Doce do Ultramar Português*" by Professor Fraga de Azavedo and Lidia do Carmo Murtinheira de Medeiros is such a contribution. This work is to be published in 8 parts, the first entitled "*Introdução, Generalidades*" is the subject of this review. The next 6 parts are to deal with the fresh-water mollusca of each of the overseas territories administered by Portugal and the last part is to be "*Considerações finais*".

To estimate the value of this book it is important to know the type of worker for whom it is intended. The introduction states that it is to be a contribution to the zoological atlas of the Portuguese territories. It should, therefore, be of most interest to systematists and zoogeographers. Part 1, however, will be of use almost exclusively to field and experimental workers and it is on this point of view that these remarks are based.

The authors have collected together and presented in a fairly orderly manner a good deal of the information on the ecology, collection and study of fresh-water molluscs which, up to now, has been scattered in a number of other publications. That a good deal of this information has been presented in an uncritical manner and that a considerable amount has been omitted is a pity. The volume will serve as a guide, however, to anyone totally unacquainted with fresh-water mollusca and the problems of schistosomiasis. It may even prove of use to those who, already engaged in this kind of work, feel the need for some sort of *vade mecum*.

The section on ecology underlines throughout our ignorance of many of the basic facts in this field and the need for further research. Here, as in the later parts of the book, the authors have tended to generalize too widely in discussing the physical and chemical influences on molluscan distribution but this again is perhaps a further reflection of our lack of knowledge. Section IV on molluscan classification opens with a brief discussion of the species concept and it is encouraging to note that the authors have appreciated the dynamic nature of the species and are not attempting to use it as a rigidly static and non-dimensional unit. If they have been able to adhere to this concept in the subsequent systematic parts of the work they will have made a very great contribution to the subject. The remainder of the section dealing with classification is a little disappointing. The choice of *Australorbis glabratus olivaceus* as the example used for the description of dissection technique is an unfortunate one in that it is a snail of South American origin and is not at present known to occur in any of the Portuguese territories. The use of the trinomial system of nomenclature here is of doubtful validity since our knowledge of the taxonomy and variation of such snails is still too elementary to justify the use of sub-specific names except in a few well-studied cases. Passing to the suggested morphological criteria for species discrimination and their treatment it seems that too many characters are to be considered in too much detail. Such details as the number of acini in the gonad, the dimensions of the albumen and muciparous glands, also those of the prostate and the relative diameters of the male and female gonoducts, are all too liable to variation with age to be of any great value in making a specific diagnosis. The use of absolute measurements of soft parts as specific characters must always be treated with a great deal of caution, and the use of too many variable characters can often lead to an excessive degree of separation of related forms.

The description of techniques employed in the laboratory culture of snails is good and is presented in considerable detail. The methods recommended for the establishment of balanced aquaria with suitably purified water are similar to those devised by STANDEN, but it must be remembered that all species of snails do not flourish under such conditions; *Bulinus forskali*, for instance, appears to thrive best in rather dirty and apparently unbalanced aquaria. Little need be said concerning the parts dealing with experimental infection work, since here again a comprehensive account is given. The publication of plates 65 and 66 seems a little unnecessary since they illustrate cercariae of unknown species found in snails from Moçambique. This last point raises the subject of the illustrations.

The profusion of half-tone plates is impressive but on close examination rather disappointing. Several of the photographs of habitats in the early part of the book are of poor quality and almost meaningless; the illustrations of aquatic plants might have been better if based on fresh specimens rather than pressed museum material, and the use of separate half-tone plates to illustrate pairs of forceps, a perforated spoon and a paint brush seems hardly necessary. The line drawings illustrating shell form and stages in the dissection of a snail would have been clearer and more helpful had they been reproduced by line blocks.

As a reference work this book has serious limitations due to the lack of attention given to the preparation of the bibliography. Throughout the text are references to BARLOW 1951, but the full title is omitted in the bibliography as is the case also with YOLLES 1947, ARCHIBALD 1933 and MEILLON 1951. It is also annoying to find that dates given in text references do not correspond to those in the bibliography.

If some of the remarks in this review seem to be unduly harsh it is because of the tendency of field workers to seize upon any new publication and follow it, forsaking all other. For this reason the reviewer has attempted to point out some of the pitfalls in this latest work. The authors deserve credit for undertaking the compilation of information on this most important subject, although at the present time when research is advancing rapidly it is impossible for it to remain up-to-date for long.

C. A. Wright

OLIVIER, L. **The Location of the Schistosome Vectors,** *Australorbis glabratus* **and** *Tropicorbis centimetralis*, **on and in the Soil on Dry Natural Habitats.** *J. Parasitology.* 1956, Feb., v. 42, No. 1, 81–5.

The effects of desiccation upon *Australorbis glabratus* and *Tropicorbis centimetralis* and the behaviour of these snails during the recession of flood water has been studied in the field in 7 locations in north-eastern Brazil. Fifteen dry plots of 1 metre square, situated in the bottoms of depressions filled with flood water in the rainy season and known then to harbour snails, were examined in the following manner: snail collections

were made of those shells visible at the surface; on the vegetation and debris overlying the soil; from the first centimetre of soil; from the second and sometimes third centimetre of soil and from a block of soil ½ metre square and 3 cm. thick, raised from the centre of the examination area. The dried mud was sieved to yield all snails more than 1 mm. in diameter.

It was concluded that the majority of the snails remain stranded as the flood waters recede and that active burrowing is unlikely and may, in any case, be detrimental. It was found that snails can survive for long periods when buried in soil that is not water-saturated but that water-saturated mud is a very unsuitable environment. It is suggested that those snails found deep in the soil probably reached that position by agencies other than their own feeble burrowing powers. It was found that of the snails recovered in successive examinations as the dry season progressed the ratio of living snails to empty shells changed from 1 to 3 to 1 to 6, thus indicating that the mortality rate is markedly increased by desiccation. *O. D. Standen*

Lagrange, E. Considérations sur la pathologie de la bilharziose à *Schistosoma mansoni.* [**Observations on the Pathology of Schistosomiasis due to** *Schistosoma mansoni*] *Ann. Soc. Belge de Méd. Trop.* 1955, Dec. 31, v. 35, No. 6, 719–24. [10 refs.]

The author records some conclusions he has reached during 8 years' experimental work on *Schistosoma mansoni.* In many thousands of infections in mice death has always resulted within 2 to 4 months when eggs were present as a result of the presence of adult worms of both sexes in the portal system. Some mice after infection with cercariae from only 2 planorbid snails live indefinitely without symptoms, but without the passage of ova in the stools; on autopsy of these, worms of only one sex, usually male and less commonly immature female, can be recovered. In heavily-infected mouse livers pseudo-tubercles form around collection of eggs. With virulent strains of schistosomes (such as Vogel's) successful infection follows exposure to 20 to 50 cercariae. In some cases after exposure to 160 cercariae, this same number of adults has subsequently been recovered. The spleens of infected mice contain neither eggs nor worms, but they are more enlarged than is the case in any other bacterial or parasitic infection of mice. Schistosomal cirrhosis of the liver has not been seen in mice. Schistosomal infection renders mice more susceptible to other infections; a partial hepatectomy, which is not fatal in healthy mice, is lethal to mice with schistosomiasis.

Rats are considerably more resistant to schistosomal infections than are mice. Exposures to 400 cercariae result in successful infestation of only a few of the animals, and the infestation is light. Cotton rats (*Sigmodon hispidus*) can be infected, and though on the same diet as the preceding animals, in some cases develop a characteristic hepatic cirrhosis,

though not unduly heavily infested; in these animals the presence of the eggs does not seem to provoke the local pseudo-tubercle formation seen in the livers of infected mice. Some of the infected cotton rats survive for 8 months; they never die from intestinal haemorrhage. The infected guineapig never discharges eggs in the faeces; heavy exposures to infection (100 cercariae) result in light infestations (3 adult worms) and the infection is self-cured after some months.

The results of schistosomal infection in animals therefore differ much with the species of host used; they do not necessarily bear any relationship to those occurring in man. The recorded differences in the pathology of human schistosomiasis in various parts of the world may be due to differing diets, as well as to the varying intensities of the worm infection.

During a visit to the Ituri region, Belgian Congo, in 1951 the author saw patients with schistosomiasis. In one area the Lake Albert fisherfolk, constantly exposed to daily reinfection, were in good physical condition although all had abdomens swollen by enlarged livers. During the war years, however, these same people were undernourished and overworked; as a result there was a severe epidemic of grave schistosomiasis. Rectification of the diet and hours of labour ended this epidemic. In another lake area though liver hypertrophy and ascites were common these were not associated with the passage of schistosome eggs; feeding those affected with a diet rich in protein for several weeks produced no clinical improvement. Schistosomiasis is prevalent also in this latter area; in the absence of a parasitological diagnosis in each case the clinical picture cannot be ascribed to it.

A careful statistical study of cirrhosis, and of liver and spleen enlargement in schistosomiasis-endemic, as well as schistosomiasis-free, areas in Africa would do much to add to our knowledge of their causation in the tropics. There is much to learn of these matters, but there is already good reason to believe that much of the serious liver disease met with in Africa is not due solely to schistosomiasis. *A. R. D. Adams*

Willard, B. C., Jr. **Fatal Hematemesis in *Schistosoma mansoni* Infection.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 150–57, 4 figs.

A Puerto Rican male, aged 28, was admitted to hospital in Florida with a history of sudden epigastric pain and a haematemesis of " more than three quarts " 4 hours earlier. Five months antecedent to this he had suffered acute epigastric pain for 2 hours, and one month before his admission he had had melaena. He gave no other history of relevant antecedent illness.

On admission he vomited a pint of blood; during the next 24 hours he suffered from 6 further haematemeses; despite large transfusions he lost more blood than could be introduced artificially. The spleen was felt to be enlarged 2 fingers breadth below the costal margin; there was

some tenderness in the left lower abdomen; the tentative diagnosis was a duodenal ulcer.

An emergency operation was deemed imperative. During induction of the anaesthesia there was a further large haematemesis, and blood was aspirated; this demanded bronchoscopy. The stomach, large and small bowels were distended with blood; a gastrostomy near the duodenum failed to disclose duodenal bleeding, but the gastric mucosa generally was bleeding freely. There was no evidence of loss from oesophageal varices; a large bleeding vessel on the lesser curvature of the stomach was ligated; but the general oozing from the gastric mucosa continued. The patient died 3 hours after operation; 29 pints of whole blood had been transfused during his survival in the hospital.

On autopsy, which was confined to the abdomen, it was established that the patient harboured a *Schistosoma mansoni* infection with extensive periportal fibrosis and cirrhosis of the liver; the extensive haemorrhages derived from gastric varices. Many characteristic eggs were seen on section of the liver; many single and paired worms were recovered from veins in the submucosa and serosa of the oesophagus and from the stomach immediately around the cardio-oesophageal junction; only a few eggs were found in the mucosa of the fundus. Very few worms were seen in the submucosal veins of either the large or the small intestines, though there were numerous eggs there.

The author suggests that in this case the prolonged shock and the surgical procedures may have caused their environmental conditions so to alter that worms migrated from their usual habitat.

A. R. D. Adams

Shakir, M. H. **Effect of Storage on Sodium-Antimony III Bis Pyrocatechin Di-Sulphonate of Sodium.** *J. Egyptian Med. Ass.* 1956. v. 39, No. 1, 24–30, 1 fig.

"The samples of Fouadin and Stibophen giving rise to toxic manifestations in human beings were examined spectrophotometrically and biologically (toxicity tests) on Swiss mice.

"The solutions of both drugs were examined twice at intervals and the mean results of the readings were taken into consideration.

"The pH of the distilled water of the solutions of both Fouadin and Stibophen was almost 7·0 in all samples.

"The biological tests were carried out on healthy Swiss mice under standardized conditions.

"There is a close relationship between the absorption spectra and the biological findings.

"The shape of the absorption curves showed that the intermediate products which may have taken place as a result of oxidation or decomposition of the original drugs if they could not be identified chemically could be shown by Spectrophotometric technique."

Lurie, H. I. & de Meillon, B. **Experimental Bilharziasis in Laboratory Animals. III. A Comparison of the Pathogenicity of** *S. bovis*, **South African and Egyptian Strains of** *S. mansoni* **and** *S. haematobium*. *South African Med. J.* 1956, Jan. 28, v. 30, No. 4, 79–82, 7 figs.

Groups of about 100 guineapigs, white mice, *Mastomys natalensis* and 2 *Cercopithecus aethiops pygerythrus* were experimentally infected with an Egyptian strain of *Schistosoma mansoni*, and South African strains of *S. mansoni* and *S. bovis*. The progressive pathological effects were followed by means of sample autopsies of the smaller animals at weekly intervals for 14 weeks, 2-week intervals for the next 8 weeks and thereafter at 4-week intervals until the infection was a year old. The monkeys were examined by liver biopsy at similar intervals.

It was found that in monkeys the pathogenic effect did not progress beyond the formation of early granulomata around ova in the liver and subsequent phagocytosis. The condition of ova in the large gut and lung was not examined. Mice and *Mastomys* showed no significant resistance to infection with *S. bovis* or either strain of *S. mansoni*. Each of these animals developed fibrosed granulomata in the liver following deposition of ova; bile duct proliferation occurred in mice with all strains but in *Mastomys* only the Egyptian *mansoni* produced this effect. Details of pathology in the guineapig are given for *S. bovis* only and are not largely different from that seen in the mouse. [Guineapigs are known to be strongly resistant to the Egyptian strain of *S. mansoni* but no information is given on this point.] It is considered that mice and *Mastomys* are more susceptible to infection than are monkeys; that *S. bovis* is more pathogenic for mice than for monkeys or guineapigs; that both strains of *S. mansoni* are more pathogenic for mice and *Mastomys* than for monkeys. A short note on infection with *S. haematobium* indicates that this species is only feebly pathogenic for mice.

[See also this *Bulletin*, 1954, v. 51, 71.] *O. D. Standen*

Sinha, P. K. & Srivastava, H. D. **Studies on** *Schistosoma incognitum* **Chandler, 1926. I. On the Synonymy and Morphology of the Blood-Fluke.** *Parasitology*. 1956, May, v. 46, Nos. 1/2, 91–100, 5 figs. [18 refs.]

Hsu, P. K. **A Preliminary Study of the Morphology and Bionomics of** *Oncomelania* **Snails in Kwangtung Province.** *Chinese Med. J.* Peking. 1955, Nov.–Dec., v. 73, No. 6, 477–92, 19 figs. [24 refs.]

The morphology of the shell, operculum, false " eyebrows ", verge and radula is described for snails of the genus *Oncomelania* collected in two areas of Kwangtung province. Considerable variations in individuals or

in groups of individuals living under different conditions led the author to doubt the validity of shell shape or sculpturing as a distinctive specific character; also since his evaluation of the denticulation of the radula of *O. hupensis* is the same as that for *O. nosophora*, as described by ANNANDALE, then the value of the denticulation formula is open to question.

The paper provides an interesting account of the bionomics of *Oncomelania* in Kwangtung. The snails are amphibious, prefer shaded and moist ground with rich food (largely decaying *Vallisneria spiralis*), and regular flooding to enable egg-laying and hatching to occur. Although essentially amphibious and living in the soil when conditions are optimal, the snails can survive under water for some months.

The snails copulate throughout the year but egg-laying usually occurs only from the end of January to the beginning of May. The snails lay their eggs singly and are found with minute soil or sand particles attached. They may be laid in mud or on any submerged surfaces after the end of the dry season. Newly hatched snails live entirely under water for the first 3 weeks but by the 6th week leave the water entirely to live in moist places on land. Mating occurs at $2\frac{1}{2}$ months and eggs usually hatch 2–3 weeks after being laid but may not hatch until the following spring, some months later.

Cercarial emergence from the snails commences in February and continues at its climax from March or April to August. The rate of emergence falls from then but cercariae may be produced even in December and January when the temperature may be as low as 15°–16°C. In nature the seasonal fall in temperature usually promotes hibernation but, with similar temperatures but enriched diet and water change provided under experimental conditions, hibernation may be avoided.

The author considers that snail control may best be brought about by the building of dykes to prevent flooding during the rainy season and the cultivation of the unflooded land; such changes should remove many of the conditions essential for the life-history of *Oncomelania*.

O. D. Standen

YASURAOKA, K. **The Behavior of** *Oncomelania nosophora*, **the Intermediate Host of** *Schistosoma japonicum*, **to Gravity in Water.** *Japanese J. Med. Sci. & Biol.* 1955, Oct., v. 8, Nos. 4/5, 313–21, 4 figs.

"On placing *Oncomelania nosophora* on the plane at different angles of inclination, their behavior to gravity was observed, and the following results were obtained.

"1) The initial appearance of negative geotaxis of snails was observed when an angle of inclination reached to 7°.

"2) The degree of upward locomotion of snails increases steadily as the inclination of the creeping plane is made larger, and the standard

deviation of θ becomes smaller as α increases. This means that the precision of the orientation is enhanced.

" 3) No significant correlation was seen between the velocity of geotactic locomotion of snails and the angle of inclination."

[See this *Bulletin*, 1954, v. 51, 811.]

YASURAOKA, K. **The Behavior of** *Oncomelania nosophora*, **the Intermediate Host of** *Schistosoma japonicum*, **to Light in Water.** *Japanese J. Med. Sci. & Biol.* 1955, Oct., v. 8, Nos. 4/5, 323–9, 4 figs.

" The behavior of *Oncomelania nosophora* to light, the intermediate host of *Schistosoma japonicum* in Japan, in water was observed. The results are as follows:

" 1) The behavior of *O. nosophora* to light should be considered as a klinotaxis or a tropotaxis because of the form of the cephalic eyes and the orientation to light.

" 2) To sudden decrease in light intensity, *O. nosophora* showed shadow reaction. The threshold value of $\Delta I/I$ to cause the reaction was 30%. From this fact, the mechanism of aggregation of snails to the light should be considered as a result of the succession of their shadow reaction.

" 3) The effects of lights of different wave lengths upon the phototactic reaction of snails was found as follows: green ($547 \pm 15 m\mu$)>yellow ($595 \pm 14 m\mu$)>blue ($427 \pm 18 m\mu$)>red ($630 \pm 14 m\mu$)."

FONSECA, F., FRAGA DE AZEVEDO, J. & DA GAMA, M. M. Nouveaux cas humains de fasciolase hépatique au Portugal. [**New Cases of** *Fasciola hepatica* **Infection in Portugal**] *Ann. Parasit. Humaine et Comparée.* 1956, Jan.–Mar., v. 31, Nos. 1/2, 14–22, 1 fig. [19 refs.]

An account of 8 cases.

MENESES, O. Incidencia de la distomatosis hepatica en los conejos de la ciudad de Lima y alrededores. [**Incidence of** *Fasciola hepatica* **Infection in Rabbits in Lima Peru, and its Environs**] *Rev. Med. Exper.* Lima. 1952–1955, v. 9, 103–9. [12 refs.]

The English summary appended to the paper is as follows:—

" In the period between January 22 and August 22, 1954 there was carried out a survey in 538 rabbits raised in Lima and outskirts, in an effort to determine the incidence of infestation by *Fasciola hepatica*. The sedimentation technique was used in examination of the feces. At the same time as the survey, autopsies were carried out on rabbits dying

from various causes in an effort to find *F. hepatica* in the liver. The viability of eggs of *F. hepatica* obtained from feces of parasitized rabbits was also investigated. From the studies carried out, the following conclusions can be drawn:

" 1. The presence of *Fasciola hepatica* in rabbits of Lima and the surrounding area has been confirmed.

" 2. The incidence of *F. hepatica* in the rabbits studied has varied between 2·6% and 19·7%, depending on the diet.

" 3. The eggs of *F. hepatica* passed in rabbit feces are viable, which indicated the possibility that this animal could act as a reservoir of distomatosis hepatica in the city of Lima."

von Bonsdorff, B. *Diphyllobothrium latum* **as a Cause of Pernicious Anemia.** *Exper. Parasit.* New York. 1956, Mar., v. 5, No. 2, 207–30, 10 figs. [37 refs.]

" The pernicious anemia caused by the fish tapeworm, *Diphyllobothrium latum*, is described. The clinical picture is identical with that of genuine pernicious anemia, except that the disease may also occur in young subjects, and that the gastric juice contains Castle's ' intrinsic factor ' and frequently also free hydrochloric acid. It is emphasized that this disease is a true symptomatic pernicious anemia. Typical neurologic disturbances also occur. By contrast, other forms of ' megaloblastic anemia ' as a rule differ more or less markedly from the genuine pernicious anemia.

" The pathogenesis of the tapeworm anemia has been studied in clinical tests by microbiological methods and with the use of radioactive vitamin B_{12}.

" *D. latum* contains considerable amounts of vitamin B_{12}. Investigations are described which have shown 1) that dried fish tapeworm may be used as ' extrinsic factor ' in Castle's test, 2) that aqueous extracts of the tapeworm parenterally injected bring about maximal hematologic remission and improvement of the neurologic disturbances in pernicious anemia, and 3) that an intense vitamin B_{12} activity is demonstrable in the fish tapeworm with the aid of microbiologic methods. *Taenia saginata*, which does not seem to be capable of causing pernicious anemia, contains only 2% of the average amount of vitamin B_{12} present in *D. latum*.

" From these and other results it is concluded that the host and the living tapeworm in the intestinal canal compete for vitamin B_{12}. A deficiency in this substance may result and cause pernicious anemia in the host, if the tapeworm is situated in the proximal part of the small intestine. A poor supply of ' extrinsic factor ' and/or reduced production of ' intrinsic factor ' contribute to the development of pernicious anemia. The situation here described must, of course, prevail for a sufficient length of time."

Kiremerwa, D. N., Byaruhanga, D. B. & Raper, A. B. **Sparganosis with Report of Two Cases.** *East African Med. J.* 1956, Feb., v. 33, No. 2, 37–42, 1 pl. [15 refs.]

The authors think that sparganosis is commoner than the literature suggests, because the diagnosis is not made until the nodules containing the spargana are incised and their site is not diagnostic.

The first of their 2 patients was a male African from Uganda, aged 56. He had not eaten fish until his first meal of lake fish in 1954. In August of that year he had abdominal pain after a full meal and the only sign detected was a tender, moveable lump on the left side of the abdomen. Laparotomy revealed a globular, tumour-like mass, 2·5 cm. in diameter, on the wall of the colon. From this a worm protruded and incision of it disclosed what appeared to be living tapeworms inside it. The wall of the mass was formed by fibrous granulation tissue. Its inner part was very vascular, with scattered eosinophils. The innermost layer was necrotic, but there was no definite capsule. About half the diameter was occupied by a very irregular cavity lined with gelatinous and necrotic tissue. The worm was embedded in this and in the wall of the mass. It could not be removed entire. The total length of 6 pieces removed was 16 cm., their width 1 mm. and their thickness 0·5 mm. The anterior end was like an elongated club without a groove. Sections showed typical tapeworm structure and it was concluded that the pieces belonged to a single sparganum, which had the form of an unbranched, crinkled ribbon. Possibly it belonged to a species of *Spirometra*. It was supposed that the sparganum developed from an ingested *Cyclops*.

The second patient was a male African, aged 40–45, who had been infected with guineaworm in 1931. He had often washed his face in the waters of swamps and rivers and the authors think that, in view of the fact that this man had never eaten reptiles and had not applied material likely to contain spargana to his eyes, his infection came from the introduction of the sparganum into the conjunctiva. This patient had a small swelling on the medial side of the right eyeball. Incision liberated a white, flat worm which was slowly drawn out and was active in normal saline. This sparganum had the form of a crinkled ribbon 26 cm. long and 2–2·5 mm. wide with a blunt anterior end, but no club-like head and no groove on this end.

The authors discuss the distribution of sparganosis, and also the modes of infection by the application of raw frogs' flesh to the eyes or by eating snakes or *Cyclops*. Only 6 cases have been reported from Africa [but Lowry (*E. Afr. Med. J.*, 1954, v. 31, 38) also referred to 4 cases of *Diphyllobothrium mansoni* seen in Masai patients]. The others have been reported from Southeast Asia, Texas, Queensland and Italy. Discussing the site of the nodules caused by spargana, the authors say that direct application of material containing spargana determines the sites of nodules acquired in this way, but that, if the procercoid or

plerocercoid larva is ingested, the nodules may be found in hernial sacs, in the jejunum or colon, near the kidney, in the pleura, or in the thigh, abdominal wall or lumbar muscles, or in the urethra or pulmonary artery. Usually, however, they occur in subcutaneous tissue or in muscles of the parietes and they may migrate slowly in these tissues or even give rise to secondary nodules. When they occur deep in the body they rarely cause symptoms, but subcutaneous nodules cause local pain, urticaria, itching and sometimes sensations of movement in the nodules.

G. Lapage

Chowdhury, A. B., Dasgupta, B., Ray, H. N. & Bhaduri, N. V. **Studies on the Hexacanth Embryo of** *Taenia saginata* **and its Enclosing Membranes.** *J. Indian Med. Ass.* 1956, Apr. 16, v. 26, No. 8, 295–301, 4 figs. (3 on pl.) [17 refs.]

Starkoff, O. Su di un esemplare triedro di *Taenia saginata* Goeze, 1782. Rassegna dei casi finora noti. [**A Specimen of** *Taenia saginata* **with Trihedral Deformity and Review of the Literature**] *Riv. di Parassit.* Rome. 1956, Jan., v. 17, No. 1, 11–20, 7 figs. [38 refs.]

The English summary appended to the paper is as follows:—

"The author reviews the cases of triedrous [trihedral] monstrosities in *Taenia saginata* found in the literature and reports a personal observation made in the city of Rome."

Feng, L. C. **The Combined Use of Pumpkin Seed and Areca Nut in the Treatment of Tapeworm Infections.** *Chinese Med. J.* Peking. 1956, Jan.–Feb., v. 74, No. 1, 17–36, 9 figs. [15 refs.]

The author gives a summary of work by Chinese workers since 1936 on the action of areca nut on *Taenia solium* and *Taenia saginata*. It is claimed to be very effective for human infections with *T. solium*, *Hymenolepis nana*, *Diphyllobothrium latum* and *Fasciolopsis buski*, but cures only 30–50 per cent. of patients with *T. saginata*, which is less dangerous than *T. solium* but is more widely distributed and the infection lasts longer (20 years or more).

The paper reports on the treatment of patients infected with *T. saginata* or *T. solium*, who were treated with areca nut and pumpkin seeds either separately or in combination. Whole pumpkin seeds, or oil-free extracts from them, or pumpkin seed oil were used. Entire worms passed by treated patients recovered their motility in normal saline and these were used to test *in vitro* the action on them of the preparations used. For details the paper itself must be consulted.

Both the *in vitro* experiments and the clinical studies showed that the active ingredient in pumpkin seeds is contained in the oil-free powder obtained by ether extraction. When active *T. saginata* were immersed in a 30 or 40 per cent. watery decoction of this powder, the scolex and the anterior, immature segments remained active, but the middle and the posterior segments became thinner and broader, with a depression at the middle of each segment; and 20 minutes after immersion the worms were paralysed. In a mixture of equal parts of a 30 per cent. decoction of areca nut and a 30 per cent. decoction of pumpkin seed powder the same effect on the middle and posterior segments was observed, but the scolex and anterior, immature segments were also paralysed. After removal to normal saline, the worms resumed normal activity in 15 minutes. The effect on *T. solium* was similar, but rather stronger.

Treatment of 165 patients infected with *T. saginata* and 20 patients with *T. solium* confirmed these results. When 9 of the former patients were given pumpkin seed alone, the kernels being masticated, only 1 was cured. Pumpkin seed oil alone cured 30–50 per cent. Pumpkin seeds and areca nut given at the same time cured 27 of 40 patients. When pumpkin seeds were given first and areca nut 2 hours later, followed by magnesium sulphate, the cure-rate was 92–100 per cent. Most of the patients passed the entire worm, but the scolex and the first 0·5–3 inches were missing from the worms passed by 22 patients, although they were cured. The author suggests that the missing portion was detached in the rectum (by contraction of the anus) [see Feng, *Peking Nat. Hist. Bull.*, 1950, v. 18, 63].

Two patients with *T. solium* treated with pumpkin seeds only were not cured; of 10 given areca nut alone, 8 were cured, while 4 given both areca nut and pumpkin seeds together were all cured, and the same result was obtained when these preparations were given separately at an interval of 3 hours. The author remarks that the effects on this species were probably due to the areca nut alone, his earlier work (*loc. cit.*) having shown that it can cure 100 per cent. of patients with *T. solium*.

The author concludes that the large doses of pumpkin seeds formerly thought necessary are not advantageous. He recommends giving 80–125 gm. of a powder made from pumpkin seed kernels, taken either fresh or after boiling in water, followed in 2 hours by 60–100 gm. of areca nut decoction. This is followed in half an hour by 30 gm. of magnesium sulphate. Higher doses can be prescribed, but doses higher than 100 gm. of either preparation are not needed. Trituration of areca nut with gelatin removes its high content of tannin and reduces its irritative properties.

This satisfactory method of treatment could be popularized in China, where areca nut is sold in drug stores everywhere and where pumpkin seeds can be bought readily in groceries. *G. Lapage*

Gonzales-Mugaburu, L. & Arbaiza, E. Nota sobre cisticercosis en cerdos sacrificados en el Matadero Municipal de Chiclayo (Depto. de Lambayeque). [**Cysticercosis in Pigs Slaughtered in the Municipal Abattoir in Chiclayo, Peru**] *Rev. Med. Exper.* Lima. 1952–1955, v. 9, 116–18.

Between 1941 and 1951 the average positive findings amounted to 3·5 per cent.

Belton, C. H. **Report on a Case of Multiple Hydatid Cysts, Hepatic, Pulmonary and Endocardial.** *New Zealand Med. J.* 1956, Feb., v. 55, No. 305, 62–3, 5 figs. on 2 pls.

"A fatal case of multiple hydatid cyst with rupture of subendocardial cyst in the right ventricle is reported."

di Bello, R. El diagnóstico y las formas clínicas de la hidatidosis cardíaca. [**Diagnosis and Clinical Patterns of Cardiac Echinococcosis**] *An. Facul. de Med. Montevideo.* 1955, Mar.–Apr., v. 40, Nos. 3/4, 93–108, 9 figs. [68 refs.] English summary.

Menéndez, H. & di Bello, R. Corazón pulmonar crónico hidático. [**Chronic Cor Pulmonale of Hydatid Origin**] *An. Facul. de Med. Montevideo.* 1955, Mar.–Apr., v. 40, Nos. 3/4, 133–52, 13 figs. [51 refs.] English summary.

An account of 11 known cases with discussion.

Franco, A. A ancilostomíase em Santiago. [**Ankylostomiasis in Santiago, Cape Verde**] *Anais Inst. Med. Trop.* Lisbon. 1955, Dec., v. 12, No. 4, 633–51, 6 charts (1 folding).

The English summary appended to the paper is as follows:—

"Based on the works of Ferreira Guedes (1952) and Nobre Martins (1954) which have suggested to the author the probable existence of autochthonous hookworm disease in the Island of Santiago, it was possible to confirm it by the finding of a very high percentage of cases of confirmed autochthonous origin.

"This affirmation of the author is based on the fact that among the 329 individuals who were infected, only 14 had been out of the Island, to places where the existence of hookworm disease is known, as the Island Brava, S. Tomé and Principe, Guinea, Angola or Mozambique, therefore a percentage of 4·2 of the patients infested by hookworm had the opportunity of being infected outside of the Island, which proved undoubtedly the permanence of the hookworm infection in Santiago."

Kennedy, A. F. **Some Aspects of a Hookworm "Carrier" State in African Mineworkers.** *Central African J. of Med.* 1956, Mar., v. 2, No. 3, 104–6.

A single stool specimen from each of 100 African recruits in a Southern Rhodesian colliery showed 27 to be harbouring hookworms. Detailed examinations were then made of 62 in-patients, on whom stool examinations, carried out because of diarrhoea, had demonstrated hookworm ova. Of these, 13 patients were found to have hepatomegaly and 13 were found to have splenomegaly, in 8 both organs being enlarged. These enlargements are common among the African mineworkers and are probably unrelated to ankylostomiasis. There was a significant degree of anaemia, haemoglobin 12·8 gm. per cent., in the group compared with 14·04 gm. per cent. in healthy controls. [No comparison was made with a group of sick in-patients without ankylostomiasis.] The degree of anaemia seemed to be associated more with the degree of malnutrition than with the intensity of hookworm infection as judged by egg counts. The author was surprised to find that the eosinophil counts bore no relation to hookworm incidence but rightly concludes that the absence of an eosinophilia indicated that the hookworm infection was not recent. The microclimate of the soil does not favour re-infection in the Wankie Colliery, the infections clearly having been acquired in the places of previous residence of these immigrant mineworkers.

Frederick J. Wright

Gonzales-Mugaburu, L. Algunas observaciones sobre parasitismo intestinal en escolares de Iquitos. [**Observations on Intestinal Parasites in Schoolchildren in Iquitos, Peru**] *Rev. Med. Exper.* Lima. 1952–1955, v. 9, 110–15. [12 refs.]

The English summary appended to the paper is as follows:—

"A parasitological examination of 100 students in the city of Iquitos, on two different dates has again confirmed the high percentage of infestation with *Ancylostoma* or *Necator* (98·5%).

"Parasitological examination has yielded a higher percentage of *Strongyloides stercoralis* (60·6%) than reported by other authors.

"The degree of parasitism by *Ancylostoma* or *Necator* is approximately similar to the results previously reported."

Rizzotti, G. Ricerche sull'etiologia delle eosinofilie di grado elevato in Etiopia. [**Studies on the Aetiology of Eosinophilia in Ethiopia**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, Apr., v. 37, No. 4, 186–210. [15 refs.]

The English summary appended to the paper is as follows:—

"The author refers some statistical data proving that eosinophilia is

frequent in Ethiopia and reports the results of his investigations concerning 49 cases of eosinophilia higher than 20%. In 11 of these cases where the duodenal catheter was employed, huge amounts of parasites were found which could explain the presence of the eosinophilia. No parasites or small quantities of them were seen at the examination of the stools.

" In 10 cases the parasites belonged to the Strongyloides stercoralis, in one case to the Schistosoma mansoni together with the Schistosoma haematobium. Of the 38 cases where the duodenal catheter had not been employed, only in 2 the cause of the eosinophilia could be explained by the investigations. When the material yielded by the duodenal catheter before and after the introduction of the magnesium sulphate was examined, it was noticed that the parasites were more numerous in the samples taken after the introduction of the solution."

Montestruc, E. & Berdonneau, R. L'anguillulose dans les grandes éosinophilies dites " tropicales " ou encore des " pays chauds ". [*Strongyloides* **Infection in the Massive Eosinophilia known as Tropical Eosinophilia**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 663–8.

The term " tropical eosinophilia " is inappropriate in the authors' view because in their experience in Martinique a helminthic factor was rarely absent. *Strongyloides stercoralis* is one of the helminths which evoke hypereosinophilia. The larvae of this parasite are very difficult to demonstrate by simple faecal examination and even by concentration methods. In the great majority of the authors' cases (11 out of 14) repeated " coproculture " proved to be necessary in order to make a diagnosis. In those patients infected with this parasite no differences in the eosinophilic response were apparent in white or coloured races.

In an addendum the authors quote an additional case in which no parasites were found.

In the ensuing discussion Deschiens and Galliard questioned some of the authors' conclusions, which were based on a limited number of cases.

Philip Manson-Bahr

Yanagisawa, T. **On the Structure and Formation Process of the Egg-Shell of** *Ascaris* **Ova.** *Japanese J. Med. Sci. & Biol.* 1955, Oct., v. 8, Nos. 4/5, 379–90, 2 pls. [11 refs.]

Bachofer, C. S. & Pahl, G. **Influence of Extended Temperature Treatments on Recovery of X-Irradiated** *Ascaris* **Eggs.** *Radiation Res.* New York. 1955, Feb., v. 2, No. 1, 50–63, 5 figs. [16 refs.]

Macciotta, A. & Artizzu, Maria. Su un caso di intensa ascaridiasi a rapido esito mortale, in quadro shockale, in bambino di 6 anni. [**Fatal Case of Massive *Ascaris* Infection in a Child of 6 Years, with Rapid Death in Shock**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1956, Apr., v. 37, No. 4, 211–25. [22 refs.] English summary.

Benarroch, E. I. & Villegas J., R. Eficacia comparada del Hexilresorcinol y de una mezcla de tetracloretileno y cuenopodio en el tratamiento de Helmintiasis intestinales. [**Comparative Efficacy of Hexylresorcinol and a Mixture of Tetrachlorethylene and Oil of Chenopodium in the Treatment of Intestinal Helminthic Infections**] *Rev. Sanidad y Asistencia Social.* Caracas. 1954, May–Aug., v. 19, Nos. 3/4, 197–208. English summary.

The authors treated 716 patients suffering from *Necator*, *Ascaris* or *Trichuris*, or all three, in 2 series of treatments in 2 different areas of Venezuela.

The tetrachlorethylene-chenopodium mixture (TC) was in the ratio of 3 parts to 2. It was given in gelatin capsules as a single dose, followed by a saline purgative, to patients over 11 years. In the first series the dosage was 2 to 3 cc. and in the second, 4 cc. For children below 11 years the mixture was given in castor oil in a dosage of 5 to 10 drops for each year of age [shown in the text as 4 to 5 drops for each year of age].

Hexylresorcinol (crystoids) were given in a dose of 0·6 to 1·0 gm. followed by the purgative 6 to 12 hours later. The drugs were given to fasting patients with no previous preparation. Stoll counts for eggs were made before and 12 days after treatment. The results are analysed in 4 tables. The best results were obtained with the 4 cc. dosage of TC: the percentage of patients freed of *Necator*, *Ascaris* and *Trichuris* were 88, 100 and 66. With the lower dosage of TC and with hexylresorcinol the corresponding figures were 69–74, 67–73, and 52–60 per cent.

The authors note that better results were obtained in the second series and suggest that a local factor influenced this result [but the higher and most effective dosage was given only in the second series].

H. J. O'D. Burke-Gaffney

Donso, F. Infecciones por *Ascaris lumbricoides* en niños tratados con citrato de piperacina. [*Ascaris lumbricoides* **Infections in Children treated with Piperazine Citrate**] *Bol. Chileno de Parasit.* 1955, July–Sept., v. 10, No. 3, 49–52. [11 refs.]

The English summary appended to the paper is as follows:—

"The authors studied the effects of Piperazine Citrate (Syrup of 'Antepar') against *Ascaris lumbricoides* infections in 30 children between 20 months and 10 years old.

" The drug was given at the dose of 80 mgr. per kilogram daily, during 5 days, in only one intake in the morning, before breakfast. The following day, at the end of the treatment, a saline purgative was given to all the patients. Strict hygienic measures were advised at the moment of the drug prescription.

" The parasitologic diagnosis and the control of the treatment were made by stool examinations using the Telleman's modified method, with the observation of 3 stool samples, every third day.

" 28 out of 30 patients (93·34%) were free of parasites after five days of treatment. No important untoward effects were observed."

Gordon, R. M. **The Host-Parasite Relationship in Filariasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Nov., v. 49, No. 6, 496–507.

In his Presidential Address to the Royal Society of Tropical Medicine Professor Gordon considers the host parasite relationship in filariasis. He refers to the addresses of two former Presidents, Sir Neil Hamilton Fairley, 1951 [this *Bulletin*, 1952, v. 49, 634], and Sir Rickard Christophers, 1939 [*ibid.*, 1940, v. 37, 174], both of whom believed that in schistosomiasis and in malaria, respectively, the detailed knowledge of the parasite and its life cycle at that time available was insufficient to enable widespread and satisfactory control of these parasites to be rapidly exercised. Professor Gordon stresses that in arriving at these opinions these two Presidents were able to distinguish clearly between established fact and conjecture. He illustrates this necessity by considering the opinion of Sir Patrick Manson, who similarly distinguished fact from conjecture and who, after describing the morphology of the malarial parasite, its erythrocytic cycle in the human host, and its development to the oöcyst stage in the stomach of the mosquito, then conjectures that " man . . . may become infected by drinking water contaminated by the mosquito; or, and much more frequently, by inhaling the dust of the mud of dried-up mosquito-haunted pools; or in some similar way ". After calling for further research Manson then pointed out that every effort should be made to establish or confute this hypothesis concerning the manner in which the malaria parasite was transmitted from the mosquito to man because of its importance from a scientific and practical point of view—a conjecture which later was slain by plain fact.

The importance of filariasis and the urgency of the consideration of control has been increasingly realized recently, but it is doubtful whether the knowledge at our disposal is sufficient to enable filariasis to be controlled as successfully as other arthropod-borne infections, such as malaria, trypanosomiasis and yellow fever. As far as loiasis, onchocerciasis, and acanthocheilonemiasis are concerned, our knowledge is in much the same state as was the knowledge of malaria when Manson's book was first published more than 50 years ago.

Distinction between fact and conjecture is illustrated in the host-parasite

relationship in loiasis. In an attempt to define " good " and " bad " hosts Gordon proposes as a definition of a good host, one which allows a suitable proportion of the introduced parasites to reach that stage of development most propitious for the propagation of the species, such successful propagation generally being dependent on the parasite's ability to cause no serious injury to its host. Just as the term " good host " does not invariably imply lack of pathogenicity on the part of the parasite, so the term " bad host " does not necessarily imply any active resistance on the part of the host.

Using this definition as a guide, Gordon enquires to what extent the vertebrate and invertebrate hosts of *L. loa* allow the parasite to develop to the stage most propitious for the propagation of its species and what injuries, if any, the parasite inflicts on its hosts during development. The host-parasite relationship between *Loa loa* in vertebrate and invertebrate hosts is considered in detail [but this part of the address unfortunately does not lend itself to abstraction and should be read in full as should the symposium on loiasis in this *Bulletin*, 1955, v. 52, 1117]. In general terms " the facts would appear to be that *C. silacea*, when observed under laboratory conditions, is an almost ideal host for the development stage of *L. loa* and the strong presumptive evidence exists that it is similarly so in nature. It has been proved that a proportion of human beings are naturally ill-adapted hosts, and there is good presumptive evidence that a proportion of human beings can acquire some degree of resistance or immunity, which results in preventing the appearance of microfilarae in the peripheral blood in sufficient numbers for the propagation of the species. Finally we have evidence which suggests that the fly *Chrysops* and certain species of monkeys are both good hosts for *L. loa*, and we conjecture that this association represents the normal and well-established cycle of development, whereas the cycle of the human strain of *L. loa*, although well established in the fly, is badly established in man ". The gaps in the factual knowledge of loiasis are stressed, and the similar lack of fact, compared with the vast amount of conjecture concerning the other and more important species of filariae, is emphasized.

The need for further research in filariasis is considered regarding the symptomatology, diagnosis, treatment, and the planning of control measures. " It is when we come to the planning of control measures against filariasis, and later seek to estimate the success or failure of such plans, that the necessity for further knowledge of host-parasite relationship becomes most evident. How can we confidently plan control measures directed against any particular form of filariasis while we lack knowledge of the presence or absence of an animal reservoir? At the present time, plans for the control of onchocerciasis and wuchereriasis are based on the assumption that there is no animal reservoir for either infection. Until very recently a similar view was held regarding loiasis but we now know that that assumption was false. May it not also be false in the case of wuchereriasis and onchocerciasis?

" Quite apart, however, from whether there are, or are not, animal reservoirs for human infections, there remains the problem of whether those species of vectors that are responsible for transmitting filariasis to man are in nature also found infected with other species of filariae. It is remarkable that most experienced workers on filariasis, while recognizing the fallacy of interpreting the extent of parasitization in the human population by the result of examining the peripheral blood for microfilariae, nevertheless are prepared to deduce the risk of infection from a previous survey of the numbers and infection rate found in the vectors coming to bite man. But what good evidence, morphological or biological, have we that all the forms encountered in these vector surveys are developmental stages of a species capable of infecting man? Already there is evidence that some insect vectors of wuchereriasis and onchocerciasis are capable of infection in the laboratory with species of filaria which cannot develop in man. It remains to be seen if a similar state of affairs occurs in nature.

" Even if satisfactory answers are found to these questions regarding the presence or absence of animal reservoirs of infection, and the identity of the filariae found in the insect vector, there still remains the problem of estimating the extent of control necessary to protect the human population from serious ill effects. When planning measures for the control of filariasis what should be our Plimsoll Line? Should it be similar to that generally accepted for the control of protozoal diseases such as malaria? In malaria the number of sporozoites inoculated is immaterial, provided that infection results. Nor does it matter whether the person exposed receives an infective bite once a day or once a week; the result is the same, because the individual parasite is capable of reproducing itself, until saturation of the vertebrate host has been reached. In filariasis, however, the situation is different: the parasite, although it can produce microfilariae, cannot reproduce itself, and each infective form introduced by the vector can result in the production of only one adult, male or female. Recent work by one of my colleagues has shown that in onchocerciasis the host-parasite relationship is seriously interfered with only after long-continued series of infective bites have been received by the human host. It appears possible, although it can by no means be regarded as proved, that in onchocerciasis even a small reduction in the infective density of the vector may lead to a reduction in the incidence of blindness, or even to its complete elimination. If further research confirms this opinion, methods for the control of onchocerciasis may have to be planned on a new basis. Until we have settled these questions, all of which are directly or indirectly concerned with the host-parasite relationship, what reliance can we place on deductions drawn from previous surveys, or how can we plan future surveys to be undertaken both before or after the instigation of control measures?

" It is to be hoped that no one will interpret these remarks as in any way belittling the value of the recent advances which have been made in

our knowledge of filariasis. The very reverse is the case, and I know that, so far as my own colleagues are concerned, they will agree with me when I say that the most valuable amongst their many contributions has been their exposure of certain previous misconceptions, because they have thereby opened up new lines of research.

" It would be equally wrong to suppose that anything which I have said tonight implies that I believe efforts to control filariasis will be of little value until we have acquired more knowledge, or that we should withhold aid from those vast commercial schemes already referred to which are now envisaged in the tropics. Nothing could be further from the truth. In war, the statesmen of an ill-prepared country send what aid they can to the point of attack; they do so to avoid immediate disaster, but for final victory they rely on long-sustained study of the enemy's strength and weakness and on never-failing attention to the improvement of their own weapons of offence and defence. I sincerely believe that a similar policy is the one most likely to bring us success in a campaign directed against filariasis ". *W. E. Kershaw*

Niles, W. J. & Samarawickrama, W. A. *Anopheles hyrcanus* **var.** *nigerrimus* **Giles: a Possible Vector of Bancroftian Filariasis in Ceylon.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Mar., v. 50, No. 2, 182–3.

Culex fatigans is the recognized vector of *Wuchereria bancrofti* infection in Ceylon. Carter [this *Bulletin*, 1949, v. 46, 486] found filarial infections in *Anopheles hyrcanus* var. *nigerrimus*, but these were thought to be derived from buffaloes.

The authors from the Medical Research Institute, Colombo, suggest, as a result of experiments carried out by them, that *A. hyrcanus* var. *nigerrimus* plays some role as a vector of *W. bancrofti* in Ceylon.

They devised a simple technique for rearing and maintaining *C. fatigans* and *A. h. nigerrimus* in the laboratory in large numbers. Adult mosquitoes kept in a saturated atmosphere at room temperature were dissected at 24-hour intervals after an infective meal. All laboratory-bred *C. fatigans* fed on a patient harbouring *W. bancrofti* microfilariae were found to be infected and infective forms of microfilariae developed in 12½ days. When this mosquito and laboratory-bred *A. h. nigerrimus* were fed simultaneously on the same patient, the intake and development of microfilariae were about the same in both species. All were found to be infected and many living infective larval forms were found in the head/proboscis 12½ days after the infective meal. *W. bancrofti* developed as successfully in *A. h. nigerrimus* as in its usual vector; and thus the latter mosquito " was not found to be refractory to infections with *W. bancrofti* ".

The authors state that " Rao and Iyengar (1932), have claimed that *Wuchereria bancrofti* is generally unable to complete its development

successfully " in *Anopheles hyrcanus* var. *nigerrimus*. [Nevertheless, Rao and Iyengar (this *Bulletin*, 1933, v. 30, 227) found developmental stages of *W. bancrofti* in 15 of 27 *A. h. nigerrimus* and concluded that " These observations show that although *W. bancrofti* is able to complete its larval development in *A. hyrcanus* var. *nigerrimus* a large proportion of the developing filariae undergo slow and retarded development ".]

H. J. O'D. Burke-Gaffney

O'Gower, A. K. **The Influence of the Physical Properties of a Water Container Surface upon its Selection by the Gravid Females of *Aëdes scutellaris scutellaris* (Walker) for Oviposition (Diptera, Culicidae).** *Proc. Linnean Soc. of New South Wales.* 1954, v. 79, Pts. 5/6, 211–18, 1 fig. [15 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1956, Apr., v. 44, Pt. 4, 60–61.]

The larvae of mosquitos of the group of *Aëdes scutellaris* (Wlk.) are always found in small accumulations of water, such as occur in tree holes, coconut shells, empty cans and similar containers, and Penn found that the breeding places of *A. scutellaris* in New Guinea were not limited by differences in organic pollution, salinity, water flow, temperature, pH, specific gravity or vegetation. Investigations were therefore carried out to determine whether gravid females of this species were influenced in their choice of oviposition sites by properties of the surface of the container, and the following is based on the author's synopsis of them. The physical properties of the container surface affected the attractiveness of a potential oviposition site through both visual and tactile stimulation. The physical properties involved were the texture of the surface, the illuminance reflected from it and the amount of moisture or water present within the container. When these properties were studied separately, a rough surface was preferred to a smooth one, a surface of low reflectance to one of high reflectance and free water to a moist, porous surface. When these physical properties of the surface of the container were studied jointly, it appeared that the gravid females were first attracted to a site by low reflected illuminance, but oviposition itself and the proportion of the total egg batch deposited were determined by the texture of the surface. A moist, porous surface of rough texture and low reflected illuminance was so attractive as an oviposition site that all other single preferences for the various surfaces were ignored. It is concluded that such a surface, which resembles that of the preferred oviposition sites found in nature, probably determines the attractiveness of an oviposition site.

Rachou, R. G., Lima, M. M., Ferreira Neto, J. A. & Martins, C. M. Inquérito epidemiológico de filariose bancroftiana em uma localidade de Santa Catarina, como fase preliminar de uma prova profilática. Constatação de transmissão extra-domiciliária por um novo vetor.

Aëdes scapularis. [**Epidemiological Survey of** *Wuchereria bancrofti* **Infection in Ponta Grossa, Brazil. Outdoor Transmission by a New Vector,** *Aëdes scapularis*] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1955, Jan., v. 7, No. 1, 51–70, 1 plan & 1 fig. English summary.

The English summary appended to the paper is as follows:—

"An epidemiological survey of bancroftiasis has been made (December, 1953) in Ponta Grossa, a small village of S. Catarina State, Brazil, as a preliminary step for an experimental work to be done with Hetrazan.

"90·3% of the population (145 inhabitants) has been examined, revealing a microfilariae rate of 14·5%, an elephantiasis rate of 7·6% and a filariasis rate of 22·1%. The data define Ponta Grossa as a locality of high endemicity of bancroftiasis.

"In 77·8% of the inspected houses (36) and in 65·2% of the inspections made in these houses (69), the authors found *Culex pipiens fatigans* with an average number of 4·7 per inspection. 10·8% of the dissected specimens (279) of this mosquito contained larvae and 0·7% infective larvae of *Wuchereria bancrofti*.

"One specimen, among 3, of *Anopheles* (*Kerteszia*) *bellator* was found with microfilariae of *W. bancrofti*. These specimens were caught in one house.

"Among the mosquitoes caught outdoors, with human bait, 3 specimens of *Aëdes scapularis* (39 dissected) presented larvae of *W. bancrofti*, two with pre-infective and one with infective larvae. None of *C. p. fatigans* so captured was infected. This is the first time the possibility of outdoors transmission of bancroftiasis is determined in Brazil. The authors think that this fact is a consequence of the high incidence of bancroftiasis in the locality, maintained by indoors transmission by *C. p. fatigans*, the principal vector.

"This survey was carried out 25 days after the 6th application of DDT (2 gr/m^2) in the houses of the locality, as a method of malaria control, started in 1949. In the same locality a bancroftiasis survey was made in 1951–1952, where the indices of infection were, in fact, slightly lower than in the present survey. Based on both surveys the authors think that DDT indoors is not an efficient method to control the main vector of bancroftiasis in the locality."

STROHSCHNEIDER, H. **Oral and Intraperitoneal Treatment of** *Acanthocheilonema* (*Dipetalonema*) *perstans* **with Diethylcarbamazine.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 158–62. [14 refs.]

Among a large number of Uganda labourers and their families employed at Jinja, about 20,000 in all, 152 were found to harbour *Acanthocheilonema* [*Dipetalonema*] *perstans* and 39 of these latter (26 per cent.)

showed symptoms " obviously due to *A. perstans* " and were admitted to hospital for treatment. [This seems to be a bold statement.] In 7 the manifestations were very severe: after elimination of other causes, the symptoms were attributed to this nematode. As listed these were:—

subjective: giddiness, aching limbs, periodic itching, abdominal and pectoral pains;

objective: slight swelling of spleen and liver, occasional attacks of fever followed by urticarial exanthemata.

In serious cases oedema of lower limbs, scrotum and prepuce was observed. The numbers of microfilariae present bore no relation to the seriousness of the symptoms.

Diethylcarbamazine by the oral route, even in large doses up to 450 mgm. per day for 10 days, was insufficient to cure *A. perstans* infections and even a repetition of this dosage did not succeed. Having reached the conclusion that this drug is effective against microfilariae of *A. perstans*, the author assumed that it would act on the mature parasites, provided it were possible to obtain a sufficient concentration at their location in the peritoneal connective tissues.

Two patients were, on these grounds, treated tentatively by intraperitoneal application of diethylcarbamazine. A laparotomy was performed under local anaesthesia and a rubber drain introduced under the omentum. The wound was then closed around the drain, allowing the outer end of the tube to protrude some 5 cm. Through this injections were made into the abdomen as a solution of 0·5 per cent. diethylcarbamazine; 50 mgm. were administered the first day; 100 mgm. daily for the next 4 days and 150 mgm. daily for the next 5 days. One of the patients also received 450 mgm. diethylcarbamazine daily by mouth. The patients also received 800,000 units of penicillin daily. Blood specimens from the second patient were examined until the end of March 1954 at weekly intervals, from July 1953. No microfilariae could be found and there was a decrease of eosinophils. The patient felt well and resumed work. The first patient relapsed.

It is claimed that combined oral and intraperitoneal treatment was successful in one case. The author adds that " while no general conclusions can be drawn, this success can be considered encouraging for further experiments ". [It is not clear how symptoms " obviously due to *A. perstans* " were identified as such.] *Philip Manson-Bahr*

Fraga de Azevedo, J. Estado actual do problema da oncocercose Africana. [**Present Position with regard to Onchocerciasis in Africa**] Reprinted from *Anais Inst. Med. Trop.* Lisbon. 1955, Dec., v. 12. Suppl. No. 4, 30 pp., 7 figs. [34 refs.]

This is a useful monograph for readers of Portuguese. It outlines the geographical distribution and importance of onchocerciasis, and there are 2 maps showing the global distribution and that in Angola. There is

then a full discussion on diagnosis, which is accompanied by a table and figures showing the differential features of the common filarial worms. Next follows an account of treatment and finally an outline of prevention. There is a key to pupae of the species of *Simulium* found in Angola and a map showing the distribution of *S. damnosum* in that territory. There are also 3 figures showing various morphological features of 3 species. The monograph contains 34 references. *H. J. O'D. Burke-Gaffney*

Grenier, P., Hamon, J. & Rickenbach, A. Simuliidae d'Afrique Occidentale française (Haute-Volta, Dahomey, Soudan français Senégal, Côte d'Ivoire). [**Species of *Simulium* of French West Africa**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 6, 885–91, 1 fig.

The number of *Simulium* species hitherto recorded from all parts of French West Africa has been increased from 4 to 12 by the observations recorded in this paper. The list of species now given is as follows: *S. damnosum*, *S. bovis*, *S. vorax*, *S. dentulosum*, *S. adersi*, *S. medusaeforme* form *hargreavesi*, *S. unicornutum*, *S. cervicornutum*, *S. ruficorne*, *S. alcocki*, *S. johannae*, *S. macmahoni*. Notes are given on the biology of the first 6 of these, and on the distribution of all the species listed. A line diagram illustrates taxonomic features of the larva of *S. vorax*.

Of the species given above, *S. bovis* and *S. vorax* are recorded as feeding on cattle, and *S. dentulosum* occasionally on man. The record of *S. bovis* is based upon a single female specimen reared from the larva, neither of which stages are taxonomically distinguishable from *S. arnoldi*, and the identification is consequently open to some doubt on purely taxonomic grounds. *N. R. Phillips*

Dalmat, H. T. **Ecology of Simuliid Vectors of Onchocerciasis in Guatemala.** Reprinted from *Amer. Midland Naturalist.* 1954, July, v. 52, No. 1, 175–96, 7 maps. [36 refs.]

See this *Bulletin*, 1956, v. 53, 518.

Conran, O. F. & Waddy, B. B. **Effect of Antrypol Treatment on Blindness due to Onchocerciasis.** *J. Trop. Med. & Hyg.* 1956, Mar., v. 59, No. 3, 52–7, 2 figs.

The authors are very conscious of the social and economic consequences of river blindness. They have, therefore, made an attempt to bring treatment to the patients and have come to the conclusion that Antrypol given intravenously in doses of 1 gm. weekly for 5 weeks reduces the blindness resulting from onchocerciasis. They also consider it possible to administer the drug to large numbers of patients living in remote places in the bush, and that Antrypol is, therefore, the most suitable

drug with which to treat the disease as it exists in West Africa. Clinical notes of 10 patients are given.

[The authors claim that " cataracts and corneal opacities can be made to resolve " by this treatment; but a cataract is an irreversible chemical change, and it is not caused by onchocerciasis.] *D. P. Choyce*

HAWKING, F. **The Chemotherapy of Filarial Infections.** Reprinted from *Pharmacol Rev.* 1955, June, v. 7, No. 2, 279–99. [131 refs.]

The review gives an account of drugs which are active in filarial infections. The subject is suitably introduced by a brief description of the biology of the parasites. From a consideration of their life cycle it appears that an attack on the parasites by drugs may be feasible at 4 different stages in their life history, namely the adult stage, the microfilarial stage, the developmental forms in the insect vector and the infective larvae in the vertebrate host. In animals direct evidence of the results of drug treatment may be obtained at autopsy; but in human patients the evidence is partly indirect. Theoretically it is possible to eradicate certain types of these parasites completely, given suitable conditions including an active drug. Minor factors such as the occurrence of allergic reactions after drug administration have at times been a cause of failure in treatment of backward peoples. The use of antihistamines or cortisone is suggested as a possible means of combating such untoward reactions.

The importance which infection with *Litomosoides carinii* in cotton rats has played in chemotherapeutic studies, including the discovery of Hetrazan [diethylcarbamazine] by HEWITT and colleagues [this *Bulletin*, 1948, v. 45, 455], is indicated. This substance exerts its effects mostly against young forms of filariae. It also shows quite considerable differences in activity against the various species of filarial worms, and the pertinent facts relating to this aspect of chemotherapy are given in some detail. In an attempt to elucidate the mode of action of this piperazine derivative it was labelled in side-chain and ring with ^{14}C. Three fairly stable metabolites were detected, while a fourth substance was too labile to isolate. All the metabolites were inactive *in vitro*. The parent drug gives rise to very few toxic symptoms, and the fact that it is generally given by mouth adds to its value in treatment. Allergic reactions occur after its use in *Onchocerca* infections, but are transient in character. With cooperation of the patients it would be possible to eradicate foci of *Wuchereria bancrofti* and *W. malayi* by the use of diethylcarbamazine, since man is the only reservoir for these infections.

Antimonials have been tried with some success in filariasis and were first used by ROGERS [*ibid.*, 1920, v. 15, 234] in the form of tartar emetic. The only arsenical which appears to have been used to any extent is arsenamide, but it is somewhat toxic. WELCH and his colleagues

[*ibid.*, 1947, v. 44, 1015], as a result of experiments with *Litomosoides carinii*, drew attention to the antifilarial action of certain cyanine dyes. Initial hopes were not realized, however, when tests were made with these substances on infections in man. Safranin dyes, styryl quinolines and phenanthridinium compounds likewise proved of little value. Bayer 205 (Antrypol, suramin) appears to be the only drug which is lethal to adult worms in onchocerciasis, but it lacks activity against other filarial infections. The author considers that clinically the greatest need is for a drug lethal to *Onchocerca volvulus* without the toxicity sometimes experienced with Bayer 205. It is to be hoped that it will be found.

J. D. Fulton

Sadun, E. H. & Melvin, Dorothy M. **The Probability of detecting Infections with *Enterobius vermicularis* by Successive Examinations.** *J. Pediatrics.* St. Louis. 1956, Apr., v. 48, No. 4, 438–41.

"A total of 1,842 cellulose tape preparations were collected on six consecutive days from 307 patients in a mental institution. The findings indicate that a single examination is not reliable for the detection of infections with *Enterobius vermicularis*. A lower efficiency in demonstrating infections by single examinations was obtained among groups with a lower prevalence. The differences in demonstrability in groups with varying incidences and intensities of infection largely disappeared after the third daily examination and the results, consequently, were directly comparable. It is believed that a system of six consecutive examinations reveals a high and consistent proportion of the existing infections."

Chute, R. M. **The Dual Antibody Response to Experimental Trichinosis.** *Proc. Helminthological Soc. of Washington.* 1956, Jan., v. 23, No. 1, 49–58. [16 refs.]

Oliver-Gonzalez [this *Bulletin*, 1941, v. 38, 528; 1942, v. 39, (627)] reported the presence of two distinct antibodies in the serum of rats infected with *Trichinella spiralis*, an anti-adult antibody and an antilarval antibody. This finding is usually interpreted as evidence that immunity is directed chiefly, or possibly exclusively, against developing mature or adult worms in the intestine. The studies reported in the present paper have failed to confirm the presence of qualitatively different antibodies against adults and larvae.

The author's summary is as follows:—

"1. Excretions and secretions of trichina larvae are shown to be antigenic and capable of producing immunity.

"2. Evidence is also presented which indicates that the immune response acts directly upon the larvae during migration or development in the muscles as well as upon the intestinal stages.

"3. It is suggested that the 'dual antibody' basis of immunity in trichinosis may be a reflection of quantitative, rather than qualitative, antigenic differences in the two stages."

[This paper is a summarization of a thesis previously presented for a higher degree at the Johns Hopkins University. The results recorded are founded on a long series of carefully controlled experiments and the relevant literature is fully reviewed.] *R. M. Gordon*

COKER, C. M. **Some Effects of Cortisone in Mice with acquired Immunity to** *Trichinella spiralis*. *J. Infect. Dis.* 1956, Jan.–Feb., v. 98, No. 1, 39–44. [21 refs.]

"1. Cortisone treatment of mice immunized against *Trichinella spiralis* caused longer persistence of adult worms in the small intestine after a challenging infection, reduction in size of the spleens of the mice, lymphocytopenia and eosinopenia.

"2. The various daily dosages of the hormone (0·25, 0·5, 1·0, and 2·0 mg) produced no significant differences among themselves in their effects upon adult worm counts or upon size of the spleen. However, dosages above 0·5 mg affected differential blood cell counts to greater degree.

"3. Cortisone treatment rendered the immunized mice, essentially nonimmune, and, in addition, seemed to prevent in these mice the gain of acquired immunity that nonimmunized mice ordinarily develop between 11 to 14 days following *T. spiralis* infection.

"4. The results of this experiment with immunized mice substantiate earlier findings of the effect of cortisone in nonimmunized mice infected with *T. spiralis*."

DEFICIENCY DISEASES

ANDRÉ, J. & HOLEMANS, K. Signification des cheveux roux chez le nourrisson noir du Kwango. [**Significance of Red Hair in the Black Child in Kwango**] *Ann. Soc. Belge de Méd Trop.* 1955, Oct. 31, v. 35, No. 5, 467–77, 1 graph. [16 refs.]

The authors examined 642 children at Kwango, Belgian Congo aged up to three years. Of these 57 per cent. had depigmentation of the hair, called "red hair". The children were also weighed and their stools examined. Statistical analyses show that the children with red hair weighed less than those with black and were more frequently infected with intestinal worms. It is concluded that the frequency of red hair

can serve as a criterion for the evaluation of the state of nutrition of a population. *R. Passmore*

GOPALAN, C. **Kwashiorkor in Uganda and Coonoor. (A Comparison of some Salient Aspects).** *J. Trop. Pediatrics.* London. 1956, Mar., v. 1, No. 4, 206–19.

The manifestations of kwashiorkor are compared in Kampala, East Africa, with those encountered in Coonoor, South India. The basic similarities are striking. In both areas there is often no direct relationship between the inadequacy of the diet and the appearance of the disease. Infections and infestations, and possibly psychological stress, are contributory and precipitating factors.

In Coonoor roundworm is common, while in Kampala hookworm and malaria are important and anaemia is more severe than in the Indian patients.

Skeletal retardation as a result of kwashiorkor has been found in Coonoor but not in Kampala where the picture may be altered on account of fluorine. In Kampala there are large numbers of mild or chronic cases and relatively few of the severe type.

Hair changes are more common and more conspicuous in African patients than in Indian, but signs of other deficiency diseases are relatively rare. The relapse rate among the Kampala cases was very low, but until recently there has been little follow up.

The search for cheap and available proteins is described, but the prevention depends less on this than on the development of the "integrated peripheral child-welfare work" round Kampala which is highly praised.

[The hair changes in kwashiorkor can only be seen in chronic cases. When the disease develops acutely there is no time for the hair changes to become visible. The very common Indian custom of applying oil to the skin and hair tends to modify the appearance of these signs.]

Cicely D. Williams

UDANI, P. M. **Kwashiorkor (Severe Malnutrition).** *Indian J. Child Health.* 1956, Mar., v. 5, No. 3, 117–21.

This is a study of 25 cases which are carefully described. There seems to be some confusion about the varieties of malnutrition involved, the concurrent diseases, the stages at which the patients were admitted and the severity of the condition. *Cicely D. Williams*

HAEMATOLOGY

JHATAKIA, K. U. **Cobalt with Iron in the Treatment of Iron Deficiency Anaemias.** *J. Indian Med. Ass.* 1956, Feb. 16, v. 26, No. 4, 126–9.

The author treated a series of 25 cases of hypochromic anaemia (17 microcytic, 4 normocytic, 4 macrocytic), the probably aetiology being in 11 cases nutritional deficiency, in 9 ankylostomiasis, in 4 haemorrhage and in 1 tuberculosis. The bone-marrow in all cases was normoblastic. The red cell counts before treatment varied from 0·9 to 3·2 million per cmm. and the haemoglobin values from 1·7 to 8·4 gm. per cent. All patients were given daily intravenous injections of 20 mgm. saccharated oxide of iron and 1 mgm. " cobalt " per ml. diluted in glucose solution. The duration of treatment varied from 9 to 28 days and the total volume of the undiluted mixture from 45 to 175 ml. The average rise of haemoglobin per 100 mgm. of iron (with 5 mgm. of cobalt) was greater than in a previous similar series treated by daily intravenous iron without cobalt. The daily average rise was also greater. There was no increase in undesirable side-effects. Although the experiment was not strictly controlled and the series was small, the author concludes that a combination of iron and cobalt is preferable to iron alone in such cases.

[All patients at the end of treatment still showed a considerable anaemia. The absolute value of the treatment compared with other methods of administration of iron is not discussed.]

Frederick J. Wright

See also p. 1023, VON BONSDORFF, *Diphyllobothrium latum* **as a Cause of Pernicious Anemia.**

MATOTH, Y. [**Thalassemia among Kurdistan Jews**] *Harefuah.* Jerusalem. 1955, Sept. 1, v. 49, No. 5 [in Hebrew 87–9, 4 figs. on pl. (15 refs.) English summary 89].

The English summary appended to the paper is as follows:—

" Twenty-five cases of thalassemia were diagnosed during the past 3 years among children of Jews from Kurdistan residing in the Jerusalem area. Seven homozygous cases of thalassemia major are included in this series. In addition, the carrier state, thalassemia minima, was found in a number of Kurdish-Jewish individuals, including members of the patients' families and children hospitalized for other conditions. From these findings the incidence of thalassemia among Kurdish Jews is estimated to be of an order of magnitude comparable to that found in Southern Italians and Greeks.

" The pathogenesis of thalassemia, its clinical and hematologic features as well as its genetic aspects are reviewed. Autopsy findings in 2 fatal

cases and findings following splenectomy in 2 other cases are described. The available information on the racial background of Kurdish Jews is discussed.''

RAPER, A. B. **Sickling in relation to Morbidity from Malaria and other Diseases.** *Brit. Med. J.* 1956, Apr. 28, 965–6.

In the work on the relative protection which the sickling gene confers '' One approach that has not been made, strangely enough, is a simple clinical comparison of sicklers and non-sicklers, to determine whether the former suffer less than the latter from malaria that is fatal or potentially fatal ''. In a malarious country acquired immunity protects adults whether they are sicklers or not; hence such a comparison must be made on children. The author compared the causes for admission and the death rates of sickling and non-sickling children in Mulago Hospital in Kampala, Uganda. Children with sickle-cell anaemia (sickling homozygotes) were omitted from this analysis which was therefore limited to a comparison of morbidity and mortality in normal homozygotes and sickling heterozygotes.

No differences in the two groups were seen in a variety of conditions such as meningitis, diarrhoea and vomiting, and tuberculosis. A significant difference was however seen in the number of instances in which malaria caused admission to hospital and in the clinical type of malaria from which they suffered. Of 688 non-sickling children 123 (17·8 per cent.) suffered from malaria, 47 had cerebral malaria, and 6 had blackwater fever. Of 130 sicklers only 13 (10 per cent.) suffered from malaria, and none had cerebral malaria or blackwater fever. None of these sicklers died while in hospital, but 16 (13 per cent.) of the non-sicklers died, 9 of them of cerebral malaria. It can be assumed that without hospital treatment the death rate from cerebral malaria would have been higher still. The author concludes that his observations support the thesis that malaria is more likely to cause the death of normal homozygotes than of those carrying the sickling gene. It is of interest that this observation is in fact not new. M. and Mme. LAMBOTTE-LEGRAND noted in 1951 (" L'anémie à hématies falciformes chez l'enfant indigène du Bas-Congo," *Mem. Inst. Roy. Coll. Belge.*, Brussels) that they had not seen cerebral malaria in sickling children though the condition was not infrequent in non-sicklers. However, at that time no conclusions were drawn from this observation.

Some difference was also noted by the author of the present paper in the incidence of hookworm anaemia. Twenty-eight of 688 non-sicklers had hookworm anaemia, but only 2 of 130 sicklers. This difference is not statistically significant; nevertheless the author points out that '' It is quite possible that the size of a hookworm population . . . may be affected by the nature of the host's haemoglobin ''. On the other hand, 6 of 130

sicklers had typhoid, but only 11 of 688 non-sicklers. Again this difference is not significant but the author reminds us that a similar apparent disadvantage of sicklers had been noted by the Lambotte-Legrands (*loc. cit.*). *H. Lehmann*

Avery, Mary E. **Hereditary Elliptocytosis and Hemoglobin C Trait. A Report of Two Cases.** *Bull. Johns Hopkins Hosp.* 1956, Mar., v. 98, No. 3, 184–96, 7 figs. [28 refs.]

"1. The clinical and hematologic findings of two patients who manifest both hereditary elliptocytosis and hemoglobin C trait are presented.

"2. The findings in other members of the family as they pertain to these two abnormalities are outlined.

"3. Elliptocytosis and hemoglobin C trait in association do not produce a summation of effect. These patients show no clinical stigmata which can be related to their hematological abnormalities.

"4. A correlation is suggested between the severity of elliptocytosis as seen on the blood smear and the hematologic effect in the patient.

"5. The red cell life span as determined by radioactive chromium 51 was normal in the patient with elliptocytosis and hemoglobin C trait, normal in the mother with hemoglobin C trait alone, and shortened in a sibling with severe elliptocytosis alone.

"6. Osmotic fragility studies on fresh and incubated blood showed increased resistance of the incubated specimens in the patients with elliptocytosis and hemoglobin C trait. Both anomalies alone also gave some increased resistance in the incubated specimens.

"7. There was no evidence of linkage of the gene for elliptocytosis with the blood group systems in this family."

Edington, G. M. & Lehmann, H. **The Distribution of Haemoglobin C in West Africa.** *Man.* 1956, Mar., v. 56, Articles 35/47, 34–6, 3 figs. [26 refs.]

After a brief reference to the distribution of haemoglobin S, illustrated by a useful map indicating the position as at present known, the authors review the literature of haemoglobin C. In continuation of their own previous work [this *Bulletin*, 1954, v. 51, 1188] they record further data on the distribution of haemoglobin C in the Gold Coast. Tables show that a considerable difference existed between the people of the Southern and Northern Territories so far as the distribution of haemoglobins S and C were concerned, although the total frequency of abnormal haemoglobin as a whole was similar in both groups. Of 183 and 283 people examined in the southern and northern areas respectively, the percentage of abnormal haemoglobins, of S and of C, were 28·4, 19·1 and 9·8 in the

former group and 27·6, 6·7 and 21·5 in the latter. Clearly S was more frequent than C in the south, while C was more frequent than S in the north: this situation in the north is not known to occur in other populations. In one ethnological group in the north (Dagomba) the incidence of C was almost twice as high as in another (Dagarti). The C-gene frequency in the Dagomba was 14·8 per cent. and this compares with the higher ranges of S gene seen anywhere in Africa or South India.

The distribution of C haemoglobin in Africa is discussed at length and compared, in 2 maps, with that of S haemoglobin. It is suggested that the distribution of C may be spreading from north to south in the Gold Coast and thence westwards into Nigeria.

H. J. O'D. Burke-Gaffney

Aksoy, M. & Lehmann, H. **A Further Example of Haemoglobin D—in a Turkish Family.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Mar., v. 50, No. 2, 178–80, 1 fig.

Bird and Lehmann [this *Bulletin*, 1956, v. 53, 924] have already recorded the finding of haemoglobin D in Sikhs. The authors now report the discovery of this haemoglobin in 4 out of 8 members of a pure Turkish family from a mountain village of Tarsus: a survey of more than 100 other non-related pure Turks was negative.

The first member of the family to show this haemoglobin was a housewife of 40 years, who was healthy apart from having suffered from tuberculosis a year before. Examination of the family revealed 3 more heterzygotes for the genes responsible for haemoglobins A and D. All 3 were daughters: thus the mother and 3 daughters showed AD and the father, one daughter and 2 sons showed AA.

None of the 8 members of the family showed any gross haematological abnormality and radiographs of the skull and humerus were normal.

The technique is described and the haematological findings are tabulated.

H. J. O'D. Burke-Gaffney

Chernoff, A. I., Minnich, Virginia, Na-Nakorn, S., Tuchinda, S., Kashemsant, C. & Chernoff, Renate R. **Studies on Hemoglobin E. I. The Clinical, Hematologic, and Genetic Characteristics of the Hemoglobin E Syndromes.** *J. Lab. & Clin. Med.* 1956, Mar., v. 47, No. 3, 455–89, 11 figs. [44 refs.]

There have been a number of preliminary communications on the subject of haemoglobin E in Siam [notably Chernoff *et al.*, this *Bulletin*, 1955, v. 52, 193; *J. Lab. & Clin. Med.*, 1954, v. 44, 780; Chernoff, *New England J. of Med.*, 1955, v. 253, 322, 365, 416]. The present communication is a complete account of these investigations. They arose from the observation that thalassaemia as seen in Siam seemed to be atypical

when compared with that seen in Mediterranean countries [Minnich *et al.*, this *Bulletin*, 1954, v. 51, 722]. It was found that the condition was not true thalassaemia, *i.e.*, a condition due to the homozygous inheritance of the thalassaemia gene, but that a new hitherto unknown haemoglobin variant—haemoglobin E—was present and the patients were doubly heterozygous for thalassaemia and haemoglobin E. Numerous cases are described in detail, and family studies are reported to prove the genetical thesis. Six patients were also seen who were believed to be homozygous for haemoglobin E. Although the family studies were not complete, in one kinship at least a mother thought to be homozygous for haemoglobin E had 3 children with this haemoglobin variant and there was an account of 2 others who appeared to have died of thalassaemia-haemoglobin E disease. The homozygous haemoglobin E condition presented as a microcytic normochromic anaemia with the erythrocyte count usually falling within normal limits. *H. Lehmann*

Na-Nakorn, S., Minnich, Virginia & Chernoff, A. I., with the technical assistance of S. Quagqui-Puag & K. Chavalekviraj. **Studies on Hemoglobin E. II. The Incidence of Hemoglobin E in Thailand.** *J. Lab. & Clin. Med.* 1956, Mar., v. 47, No. 3, 490–98, 1 fig. [26 refs.]

As thalassaemia haemoglobin E disease was so frequently encountered in Siam it seemed of interest to determine the incidence of haemoglobin E carriers. One thousand and six racially unmixed and mixed Siamese showed an incidence of 13·6 per cent. of people with haemoglobin E. None was found in 213 racially unmixed Chinese. There was a different incidence in the various regions of Siam. Thirty-two per cent. were seen in the north-east as opposed to 13 per cent. in the central and southern regions. The figures were, however, small and future surveys of Siam will have to show whether the present results have not been due to chance. No selective protection against malaria was noted in adult haemoglobin E carriers [this could hardly be expected as in adults acquired immunity would protect haemoglobin E carriers and non-haemoglobin E carriers alike]. *H. Lehmann*

VENOMS AND ANTIVENENES

Turner, J. C. **Influence of White Blood Cells on Lysis of Red Cells by Cobra Venom.** *Science.* 1956, Apr. 13, v. 123, 631–2.

Shulov, A. [**On the Poison of Scorpions in Israel (II)**] *Harefuah.* Jerusalem. 1955, Sept. 15, v. 49, No. 6 [in Hebrew 131–3, 1 fig. English summary 133].

The English summary appended to the paper is as follows:—

"The influence of the venom of the scorpion Leiurus (Buthus) quinquestriatus upon the same species was investigated. The starting point of this investigation was the well-known story of the suicide of scorpions. Investigations were carried out upon the possible results of a sting of a scorpion upon himself, the way of stinging, the influence of temperature upon the behaviour of the scorpion and, particularly, the influence of the isolated venom of Leiurus quinquestriatus upon scorpions of the same species.

"It was found that about 20 stings carried out by 7 scorpions and one half to one fourth of the quantity of venom received by maceration of one poison gland of a scorpion, constitute the minimal lethal dose for a scorpion of this species. One poison gland of L. quinquestriatus contains 1666 MLD's per gram of white rat in comparison with some 2–4 MLD's per gram of scorpion.

"The haemolymph of a scorpion was found to possess considerable neutralizing power against the venom of scorpions, as shown by incubation in vitro and injection into white rats. This seems to confirm the validity of the ancient popular practice to apply a macerated scorpion minus the sting upon the wound inflicted by his sting."

TOXOPLASMOSIS

Harboe, A. & Erichsen, S. **A Comparative Study of the Length of the Parasites of 4 Strains of** *Toxoplasma gondii*. *Acta Path. et Microb. Scandinavica.* 1955, v. 37, No. 1, 31–41, 3 figs.

Four strains of *Toxoplasma gondii* were examined to see if there were any differences in size between them. The strains were the well-known RH (human, isolated by Sabin), GL and HG from human cases in Sweden and Ch from chickens in Norway. Measurements were made on organisms in peritoneal fluid of mice on the 4th to 8th days after inoculation, usually in the wet state under a coverslip and by dark phase

contrast. It took 3 hours to measure 100 organisms and in all 7,400 were measured. There was a highly significant difference in size (about 1 μ) between the RH and the Ch strains; the GL and HG strains resembled each other in length and lay between the two others. Fixation and staining diminished the length of the organisms by about 10 per cent.; passage through embryonated eggs produced occasional long forms. The short Ch strain reacted more weakly than the other strains in the dye test. *P. C. C. Garnham*

Kåss, E. **The Viability of *Toxoplasma* in Mouse Carcass.** *Acta Path. et Microb. Scandinavica.* 1955, v. 37, No. 1, 84–8. [17 refs.]

Mice were allowed to die of toxoplasmosis (RH strain) and their carcasses were then exposed to various temperatures for different periods of time. Suspensions of brain and spleen were mixed with penicillin and streptomycin and were inoculated into clean mice. The organisms quickly disappeared from the spleen, less quickly from the brain, the persistence of infectiousness depending upon the degree of decay. At 37°C., viability disappeared after a day; at 4°C. it lasted for 8 days and at room temperature for 2 days. Low temperatures were adverse—storage at −10°C. to −20°C. killed the organisms in 24 hours, but some survived at −10°C. for 16 hours. *P. C. C. Garnham*

Jacobs, L., Fair, J. R. & Bickerton, J. H. **Adult Ocular Toxoplasmosis. Report of a Parasitologically Proved Case.** Reprinted from *Arch. Ophthalmology.* 1954, July, v. 52, 63–71, 3 figs. [18 refs.]

"Parasites were isolated in mice, chick embryos, and roller tube cultures of chick and mouse embryo tissues after inoculation with the macerated inner layers of a human eye enucleated because of pain and blindness due to chorioretinitis of eight and one-half years' duration. By means of serological and cross-immunity tests, the identity of these parasites as Toxoplasma gondii was established. The dye test titer of the patient before enucleation was 1:64. After enucleation, weekly tests showed great variation, from 1:4,096 to 1:128. The significance of these findings is discussed."

Finlay, P. & Manwell, R. D. *Toxoplasma* **from the Crow, a New Natural Host.** *Exper. Parasit.* New York. 1956, Mar., v. 5, No. 2, 149–53.

"Toxoplasmosis has been found in the crow, *Corvus brachyrhynchos brachyrhynchos*, although the incidence of natural infection seems to be low (perhaps in the order of 1%). The strain of *Toxoplasma* isolated

from this host is morphologically like other strains of the parasite, but is less pathogenic to mice than some (such as the RH strain), killing only some 80% of these animals, and taking longer to do it. It is highly pathogenic to rabbits, but ducklings seem refractory."

DERMATOLOGY AND FUNGUS DISEASES

HERRERA, J. M. Paracoccidioidosis brasiliense. Estudio del primer caso observado en Panamá de blastomicosis sudamericana en su forma cutánea queloideana o Enfermedad de Lobo y propuesta de una variante técnica para la impregnación argéntica del parásito. [**First Case of *Paracoccidioides brasiliensis* seen in Panama and Suggested Modification of the Technique for Silver Impregnation of the Parasite**] *Archivos Med. Panameños.* 1955, Oct.–Nov.–Dec., v. 4, No. 4, 209–19, 10 figs. [27 refs.] English summary.

BALDÓ, J. I. Paracoccidioidomicosis pulmonar. [**Pulmonary Paracoccidioidomycosis**] *Rev. Sanidad y Asistencia Social.* Caracas. 1953, Jan.–Apr., v. 18, Nos. 1/2, 163–76, 6 figs. on 6 pls.

This is a general account of paracoccidioidomycosis (Lutz's disease) of the lung in Venezuela, presented at the Third Venezuelan Congress on Tuberculosis. The epidemiological, pathological and clinical features of 23 cases are described. Pulmonary involvement in Lutz's disease, once considered to be relatively uncommon, is now known to occur so frequently that many regard the lung as a primary site of the disease due to infection by inhalation.

The author draws attention to discrepancies between the findings of clinical and post-mortem examinations on individual cases of the disease. Extensive involvement of the deep groups of lymph nodes, particularly the mesenteric nodes, indicating a generalized dissemination of the infection through the lymphatic system, has been revealed at necropsy in cases which, from clinical findings, were believed to be instances of merely focalized disease. Lesions of the mouth, pharynx and larynx, which are commonly regarded as primary sites of the disease, were not present in some cases proved at necropsy. The possible relationship of pulmonary lesions and oro-pharyngeal lesions is discussed at some length. The characters of some of the nodular pulmonary lesions indicate that they are primary, but others may be due to haematogenous or lymphatic spread from foci in the mouth or elsewhere. There is much less evidence that oro-pharyngeal lesions are secondary to the pulmonary disease and

in this connexion the analogy of pulmonary tuberculosis is invoked. Clinical and radiological examinations on 23 cases showed that bucco-pharyngeal or laryngeal lesions were present in all, and pulmonary lesions in 20. On the other hand, necropsies showed 12 instances of pulmonary disease and 9 with bucco-pharyngeal or laryngeal lesions. The author makes a strong plea for more complete clinical investigations in this disease. *J. T. Duncan*

Vignale, B., Montero, E. D., Tost, J. F. & Sanjinés, A. Cromoblastomicosis (segundo caso descrito en el Uruguay). [**Chromoblastomicosis (Second Case Report in Uruguay)**] *An. Facul. de Med. Montevideo.* 1955, Mar.–Apr., v. 40, Nos. 3/4, 87–92, 6 figs. English summary.

TROPICAL OPHTHALMOLOGY

Bouchat, J. Quelques observations sur le trachome au Sahara. [**Observations on Trachoma in the Sahara**] *Arch. Inst. Pasteur d'Algérie.* 1955, Dec., v. 33, No. 4, 353–66. [12 refs.]

The following is a translation of the author's summary:—

Monthly clinical and microscopic examination of cases of conjunctivitis in 27 infants at maternity and child welfare centres, and surveys of school-children at Beni Ounif-de-Figuig (Oran, Sahara) resulted in the following observations:

1. Trachoma is earlier in negroids than in white persons.

2. Nearly 80 per cent. of the children in the *ksars* develop trachoma before the age of 1 year.

3. The so-called "seasonal" conjunctivitis, which is very frequent in this area, is sometimes contemporaneous with the beginning of trachoma.

4. In the determination of onset of trachoma a summation of infections plays a dominant part: this gives the disease its peculiar characteristics, a single infection being capable of being arrested quickly.

5. The development of trachoma under treatment at school shows the harmful effect of long holidays, during which control is interrupted, and the necessity for continuing such control until the pupils' schooling is ended. *H. J. O'D. Burke-Gaffney*

See also p. 971, Ronnefeldt, Endemische Malaria und Anämie. [**Endemic Malaria and Anaemia**]

See also p. 1049, Jacobs *et al.*, **Adult Ocular Toxoplasmosis. Report of a Parasitologically Proved Case.**

See also p. 1038, Conran & Waddy, **Effect of Antrypol Treatment on Blindness due to Onchocerciasis.**

MISCELLANEOUS DISEASES

Kouwenaar, W. **Rhinoscleroma. A Review of the Present Situation.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, Mar., v. 8, No. 1, 13–22.

There are at present between 3,000 to 4,000 known cases of rhinoscleroma in the world. The best known focus is in Eastern Europe: Russia, Poland and Galicia. Other minor foci exist in South Switzerland, Italy, some parts of Asia, North and Central Africa, with a large focus in Egypt. In the New World there are small foci in Brazil and Argentina, but many hundreds of cases have been described in El Salvador, Costa Rica and Mexico. In the U.S.A. the disease is found mainly in immigrants from Eastern Europe or Central America.

The rhinoscleroma organism, *Klebsiella rhinoscleromatis*, is a sharply defined but singularly uniform species, but it is not possible to transmit the disease effectively to other animals, though transient granulomata may be produced.

The most useful diagnostic test is the complement-fixation reaction, which is positive in about 95 per cent. of manifest cases.

The scleromatous process may involve the greater part of the respiratory tract, but in the majority of cases the process starts in the nose.

The granulomatous stage is probably not the initial one—children of a scleromatous family suffer from mucopurulent or atrophic rhinitis, from which the specific organism can be isolated. The difficulty of describing the whole process is due to the impracticability of following up cases for many years. From the first localization the scleromatous process may (1) spread *via* paranasal sinuses; (2) grow into upper lip and infiltrate the alveolar process of the maxilla and oral mucosa; or (3) involve the pharynx by direct extension from the nose or (4) the inflammation may affect the lachrymal duct. The cervical lymph nodes are often enlarged and the organism has been isolated from the glandular tissue. A rare complication is cancer of the cicatricial tissue. The clinical picture varies in different countries. The Hebra nose, the most common sign in Sumatra, is rare in other foci. Clinical statistics from Russia and Poland show that the nose is affected in 60 to 75 per cent. of cases and the larynx in 60 to 70 per cent. The condition may last as long as 50 years.

The mortality is low and nearly all the fatalities are due to chronic stenosis of the larynx.

The scleromatous process consists of massive infiltration with plasma and other cells. Between them lie hyaline bodies staining red with eosin, sometimes lying in a cell with a distinct nucleus, but often separate. They are the bodies of Russell or Pellizari. They are not specific. Large foamy Mikulicz cells are highly characteristic of the scleromatous process.

Scleroma attacks the poor and it has been shown that 94 per cent. of the patients in Eastern Europe are poor workers or peasants and the same is true for the tropics. It is certainly a disease of unhygienic conditions. Protracted and very close contact under such conditions is apparently necessary for infection to occur, as in leprosy.

The link between different foci is difficult to establish, but it is evident that they have existed for a very long time. In Java in the traditional marionette show one puppet is impersonated with a large nose (Hebra nose) and speaks with a nasal voice, as does the sufferer from nasal scleroma.

As regards treatment, surgery has given way to the use of streptomycin, which appears to be the best method so far. It is given for 3 or 4 weeks and repeated after an interval. The granulomata usually disappear in some weeks or months. Surgical intervention may, however, be necessary if life is endangered, *e.g.*, by overgrowth, cicatrization or oedema of the glottis. *Philip Manson-Bahr*

Pattyn, S. R. & Royer, P. Endomyocardite fibreuse. [**Endomyocardial Fibrosis**] *Ann. Soc. Belge de Méd. Trop.* 1955, Dec. 31, v. 35, No. 6, 747–9, 1 fig. on pl.

The authors report the finding at the autopsy on an African of the Belgian Congo of the typical pathological changes of endomyocardial fibrosis. Death was due to pulmonary suppuration. The cardiac lesions were not very advanced. This case and those reported by Rogowsky and Thys below extend the area from which this disease has been reported.

[See also this *Bulletin*, 1954, v. 51, 839; 1955, v. 52, 203, 205, 689; 1956, v. 53, 498.] *Frederick J. Wright*

Rogowsky, M. & Thys, A. Note clinique à propos de deux cas de fibrose endomyocardique observés à Stanleyville. [**Two Cases of Endomyocardial Fibrosis at Stanleyville, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1955, Dec. 31, v. 35, No. 6, 777–84, 1 fig. on pl.

Two cases of endomyocardial fibrosis are reported from the Belgian Congo. The first patient, a boy of 10 years, presented clinically, radiologically and in the electrocardiogram as a case of mitral stenosis with pulmonary emboli but there was no improvement with digitalis and at

autopsy a normal mitral valve was found. There was a primary hypertrophy of the right side of the heart and organizing thrombi on the endocardium. The second patient, a woman of 45 years, was very ill on admission and died with ascites, hydrothorax and fibrosis of the endocardium of the left ventricle extending nearly to the mitral valve.

The authors suggest that these 2 cases may illustrate 2 ways in which endomyocardial fibrosis may develop. In the one there may be hypertrophy of the myocardium producing microscopic lesions of the endocardium which become the sites for thrombi which organize and cause an obliterative fibrosis. In the other, changes in the endothelium may be primary and fibrosis then spreads from the endocardium into the myocardium. Both processes may operate in some cases.

Frederick J. Wright

GELFAND, M. **A Comparison of Infant and Adult Bantu Siderosis.** *Central African J. of Med.* 1956, Mar., v. 2, No. 3, 110–11.

Siderosis is common in the Bantu of South and Central Africa and differs from haemochromatosis in being free from symptoms. HIGGINSON *et al.* [this *Bulletin*, 1954, v. 51, 224] have attributed this siderosis to a prolonged excessive intake of iron associated with the consumption of maize and the use of iron cooking utensils. The author [see *ibid.*, 1956, v. 53, 105] found siderosis fairly frequently in breast-fed infants and young children so undertook the study now reported in which he compared the distribution of ferric iron in selected tissues of 50 infants with that of 50 adults. He found siderosis to be common in Central African infants but its distribution is more widespread in the tissues of the adult. In the infant it is rare except in the liver and spleen. (Siderosis has rarely been reported in South African infants.) The author concludes that the source in infants must be other than the diet and he has observed siderosis in the stillborn. Malaria is not a probable local cause. He suggests a possible source is antenatal deposition of ferric iron from the maternal blood stream. He points out, however, that ferric iron is not demonstrable in the blood of a patient suffering from haemochromatosis.

Frederick J. Wright

BRAS, G. & WATLER, D. C. **Further Observations on the Morphology of Veno-Occlusive Disease of the Liver in Jamaica.** *West Indian Med. J.* 1955, Dec., v. 4, No. 4, 201–11, 9 figs. on 4 pls. [38 refs.]

This paper states that there is now no doubt that veno-occlusive disease of the liver is common in Jamaican children. The majority of children with acute attacks probably recover, but a few die and some develop a subsequent fibrosis. The evidence is consistent with the possibility that the disease is caused by an excessive consumption of bush teas, but no

new facts to provide positive support to this hypothesis have come to light.

An account is given of the autopsy findings in 19 cases. The age of the patients varied from 1 year to 40 years. Of the 19 patients, 10 died in acute attacks. The essential histological lesion is obstruction of the smaller and medium sized branches of the hepatic vein. In the acute phase thrombosis is rare and the picture is similar to that described by earlier investigators as endoplebitis hepatica obliterans. [For previous references to veno-occlusive disease in Jamaica see this *Bulletin*, 1955, v. 52, 1219.] *R. Passmore*

PARASITOLOGY: GENERAL

Červa, L. Výsledky koprologického vyšetřováni dětských domovů Pražského kraje. [**Intestinal Parasites of Children's Homes in the District of Prague**] *Československ. Parasit.* Prague. 1955, v. 2, 22–34, 9 figs. (6 on pls.). [11 refs.]

The English summary appended to the paper is as follows:—

"It is reported on the findings of intestinal parasites by the boarders of the children's homes (orphanages, foundling hospitals) belonging to the district of Prague. The faeces of 536 children in the age from 1 to 15 years were examined. There were found *Hymenolepis nana* in 5%, *Trichuris trichiura* in 3·5%, *Ascaris lumbricoides* in 0·7%, *Lamblia intestinalis* in 31%, *Entamoeba coli* in 31%, *Endolimax nana* in 3·5%, *Iodamoeba bütschlii* in 2·2%, *Entamoeba hartmanni* in 0·5% and *Chilomastix mesnili* in 1%. Among 85 adult persons of the staff *Hymenolepis nana* was found in 2%, *Lamblia intestinalis* in 7%, *Entamoeba coli* in 15%, *Endolimax nana* in 1% and *Chilomastix mesnili* in 3·5%."

Kozar, Z. Zagadnienia parazytologii lekarskiej w Republice Gruzińskiej ZSRR. [**The Problems of Medical Parasitology in the Georgian Republic of the Soviet Union**] *Wiadomości Parazytologiczne.* Warsaw. 1956, v. 2, No. 1, 27–31. English summary (5 lines).

The author gives an account of various parasitic infections prevailing in the Georgian Soviet Republic, based upon information gained during a visit to the Central Institute in Tiflis in 1955. The institute was founded in 1921, and the present staff of 25 scientific workers are engaged in a study of the public health problems of the region, the results of which appear in a quarterly journal (*Biuletin Institutu*) published in the Russian and Georgian languages. Leishmaniasis is common in Georgia, and patients undergo treatment in the clinical section of the Institute which

has 50 beds; the disease is difficult to control as an extensive reservoir of infection exists in the local fauna. Ankylostomiasis is widespread around the Black Sea, and is treated with carbon tetrachloride combined with anti-anaemic measures. Ascariasis is treated with oil of chenopodium which is produced in the neighbourhood of Batum. Giardiasis is relatively uncommon, but balantidiosis may affect 90 per cent. of the population in some villages; *Entamoeba histolytica* is present in 20 per cent. of the population in some areas, but only 3–4 per cent. of those infected showed symptoms. Malaria has been present in Georgia since classical times, and the Institute has set up a chain of 67 anti-malarial stations and carried out energetic countermeasures, and the disease which formerly affected 60 per cent. of the population now occurs as isolated cases. Mosquitoes have been effectively controlled by the establishment of *Gambusia* in reservoirs and other waters.

D. J. Bauer

See also p. 1012, Cambournac *et al.*, Inquérito sobre bilharziose vesical e parasitoses intestinais nas áreas administrativas de Cuchi, Menonge e Longa (Angola). [**Survey of Urinary Schistosomiasis and Intestinal Parasites in the Cuchi, Menonge and Longa Areas, Angola**]

Casaca, V. R. & de Carvalho, A. M. Prospecção das endemias reinantes na área de Vila Salazar (Dalatando-Angola). [**Prevailing Endemics in the Vila Salazar Area, Angola**] *Anais Inst. Med. Trop.* Lisbon. 1955, Dec., v. 12, No. 4, 575–91, 5 maps (2 folding).

The English summary appended to the paper is as follows:—

"The authors made a survey on endemics in the region of Vila Salazar (Cazengo), Angola, and relate the methods used and the results obtained as regards the endemics of malaria, intestinal parasitosis and vesical bilharziasis, the intestinal parasitosis being very high and the other two endemics considerably high although on a smaller scale.

"They recommend some measures to be adopted for the combat of these endemics."

Oseasohn, R. O., Garfinkel, B. T. & Figueroa, Etervina. **Chronic Dysentery due to Mixed Parasitic Infestation in Children. Proctoscopic Findings.** *U.S. Armed Forces Med. J.* 1955, Oct., v. 6, No. 10, 1449–51.

Two hundred and six children (mean age 3½ years) suffering from a chronic bloody diarrhoea were admitted consecutively to a Puerto Rican hospital and examined proctoscopically. Aspirated material was cultured for bacterial pathogens and examined microscopically for parasites. No pathogens of the enteric group were isolated, but a variety of protozoa

[including *Trypanosoma hominis* (sic)] and helminths were recognized. The details are set out in a table. In other tables are recorded the incidence of the various lesions seen proctoscopically, and the incidence of abnormal cellular findings in the stools. The authors conclude that in these cases of dysentery due to mixed parasitic infections there was no characteristic lesion visible proctoscopically which could be ascribed to any individual parasitic infection. *A. R. D. Adams*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Mellanby, K. **Mosquito Populations at Ibadan in Nigeria.** *Bull. Entom. Res.* 1956, Mar., v. 47, Pt. 1, 125–36, 6 figs. [11 refs.]

Mosquito larvae were derived from eggs laid in 70 earthenware pots placed in 6 situations on the site of the University College, Ibadan, Nigeria, over a period of 26 months.

Until 1950 the site was quite undeveloped, only a small portion growing crops; there were also some scattered oil palms and patches of cacao. The rest was left as "bush fallow" for 7 to 10 years during which period trees regenerated and almost impenetrable thicket flourished.

Building started in 1949 and by the time the mosquito experiment ended in May 1953 some hundreds of houses and the major part of the College had been completed. The places used for the experiment are shown on a sketch map, the results are given and an attempt is made to explain them.

Anopheles gambiae, *Aëdes aegypti* and *Culex tigripes* were the species most frequently obtained but there were also *Aëdes vittatus*, *Culex decens* and *C. duttoni*; these last 3 and some others were grouped together as "miscellaneous Culicines".

In Ibadan, *A. gambiae* larvae were commonest in the dry season and their numbers decreased as the rains proceeded. Differences between the present results and those obtained by other workers in other parts of West Africa are discussed and part of the explanation may be that in the dry season this species appears to be common because there are few other breeding places available. In the wet season, when adults as measured by other methods are apparently more numerous, fewer oviposit in the pots as there are many alternative places. But even adult catches

are not entirely accurate assessments of mosquito populations. Mosquitoes may have (like tsetse flies) a different seasonal distribution correlated with changes in vegetation density.

The results obtained with *Aëdes aegypti* and the other culicines are in agreement with those of previous workers and showed high numbers in the wet season and low numbers in the dry season.

It would seem then that though pot collections do not give a complete picture of a mosquito population, they may, in conjunction with other observations, contribute to a knowledge of the relation of a species to its environment. *H. S. Leeson*

Chow, C. Y., Thevasagayam, E. S. & Tharumarajah, K. **Insects of Public Health Importance in Ceylon.** *Rev. Ecuatoriana de Entom. y Parasit.* Guayaquil. 1954, Jan.–Apr., v. 2, Nos. 1/2, 105–50. [204 refs.]

"The present paper is an endeavour to give up-to-date information, based on the literature and our observations, of insect-borne diseases in Ceylon and the bionomics and control of the vectors. Filariasis is now the most important as malaria is well under control. House fly and head louse are common. Plague has not occurred since 1939. Oriental eye fly and scarabiasis beetle are also of some importance. Scrub typhus and Q fever were reported recently. Lists are given of mosquitoes (136 species), house flies (13 species), blow flies (59 species), fleas (17 species), and others, as well as of ticks (26 species) and mites (22 species). For the convenience of public health workers, a bibliography of over two hundred articles on insects, ticks and mites of public health importance and of potential medical importance in Ceylon, published up to the end of 1953, is also appended."

Murayati, J. A. **A Brief Note on the Occurrence of *Aedes aegypti* in the City of Baghdad.** *Bull. Endem. Dis.* Baghdad. 1956, Jan., v. 1, No. 4, 311.

See this *Bulletin*, 1955, v. 52, 1023.

Smart, M. R. & Brown, A. W. A. **Studies on the Responses of the Female *Aëdes* Mosquito. Part VII.—The Effect of Skin Temperature, Hue and Moisture on the Attractiveness of the Human Hand.** *Bull. Entom. Res.* 1956, Mar., v. 47, Pt. 1, 89–100, 1 text fig. & 3 figs. on pl. [11 refs.]

"Hands of warm-skinned Caucasian individuals were significantly more attractive to *Aëdes aegypti* (L.) than cool-skinned individuals. An artificially cooled hand is very much less attractive than a normal one.

" Hands of Negroes were significantly more attractive than those of Orientals, and both were significantly more attractive than those of Caucasians. Hands of dark-skinned Caucasians were significantly more attractive than those of light-skinned Caucasians.

" Warmer skins were more attractive even if combined with a lighter skin hue, in Caucasian subjects. Thus skin hue is secondary to skin temperature in deciding the attractiveness of Caucasians.

" Hands of individuals with low moisture output were significantly more attractive than those of high moisture output. A hand induced to perspire freely was significantly less attractive than the normal hand."

Ottawa. Defence Research Board. Environmental Protection Section. **Technical Report No. 5. Studies on the Attractancy of Laboratory Rats to *Aedes aegypti* L.** [Kingscote, A. A. & Francis, Jean D.]. 23 mimeographed pp., 7 figs. [25 refs.]

Laboratory observations were made on the numbers of *Aëdes aegypti* attracted from a cage to an underlying chamber containing rats. The apparatus is figured, and the methods of study are described in some detail. The experiments were carried out with elaborate replication and randomization; the results are analysed statistically. The rats used ranged from 2 to 101 days old. The surface temperature of the skin of the host proved to be a most important factor, 33·9 per cent. of the mosquitoes being attracted at 30°C., 3·7 per cent. at 16°C., with a consistent increase in attraction with rising intermediate temperature. Calculation of the average number of mosquitoes attracted per 10 gramme of rat did not indicate difference in attractiveness of different ages of rat. On the other hand, the larger, older, and heavier rats (above 100 gm.) attracted relatively fewer mosquitoes than young rats. Attractiveness, to some extent, increased with increase of atmospheric pressure.

D. S. Bertram

Bruce-Chwatt, L. J. & Hayward, J. **Uptake of Radioactive Phosphorus by Larvae and Adults of Mosquitoes.** [Correspondence.] *Nature*. 1956, Apr. 7, v. 177, 661–2, 1 fig.

Batches of second instar larvae of *Aëdes aegypti* were subjected to a range of radio-isotope concentrations from 17 to 4,480 mμc./ml., supplied by radio-active disodium hydrogen phosphate in solution. Larvae at the lower end of the range (17–68 mμc./ml.) emerged as adults in the shortest period, and with the lowest mortality. At progressively higher concentrations, pupation was delayed, and at the maximum was inhibited; at 2,240 mμc./ml., dead pupae resulted. Up to 140 mμc./ml., emergence occurred after an average period of 48 hours following pupation, with an adult mortality approximately proportional to the isotope concentration.

Viable adults were assessed for radioactivity by photographic exposure

for periods of between 4 and 18 hours. The resulting plates showed progressively greater radioactivity with increasing isotope concentration in the larval environment. The degree of radioactivity was significantly greater in females than in males.

Since amounts of radioactivity representing as little as 1 mμc. can be ascertained, it is suggested that the method used might be of value in qualitative field studies. *N. R. Phillips*

Clements, A. N. **Hormonal Control of Ovary Development in Mosquitoes.** *J. Exper. Biol.* 1956, Mar., v. 33, No. 1, 211–23, 7 figs. [28 refs.]

Experiments on several species of mosquito by decapitation, ligaturing them at the base of the abdomen, and implantation of presumptive neurosecretory tissues, failed to give a consistently clear-cut pattern for hormonal control of ovarian development. No, or slight, ovarian development only occurred in *Culex pipiens* form *molestus* and *Anopheles stephensi* beheaded or ligated at the abdomen within a few hours of emergence (*Culex*) or a blood-meal (*A. stephensi*). This result is consistent with findings in other insects in which there is failure to secrete essential hormone if such experimental procedures are applied within a certain period after a blood meal. Ovarian development proceeded, however, normally in *Aëdes aegypti*, *C. pipiens* form *berbericus*, and *Anopheles labranchiae* [*maculipennis*] *atroparvus* even when the abdomen was ligatured within minutes of the start of a blood meal. Evidence for a gonadotrophic hormone in mosquitoes is, therefore, acceptable for some but not all the species studied. *D. S. Bertram*

Smith-White, S. & Woodhill, A. R. **The Nature and Significance of Non-Reciprocal Fertility in *Aëdes scutellaris* and other Mosquitoes.** *Proc. Linnean Soc. of New South Wales.* 1954, v. 79, Pts. 5/6, 163–76, 3 figs. [25 refs.]

Möllring, F. K. Autogene und anautogene Eibildung bei *Culex* L. Zugleich ein Beitrag zur Frage der Unterscheidung autogener und anautogener Weibchen an Hand von Eiröhrenzahl und Flügellänge. [**Ovulation in Autogenous and Anautogenous Races of *Culex* with Observations on the Differences between Recently Emerged Autogenous and Anautogenous Females Based on Size of the Egg Batches and the Length of the Wings**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1956, v. 7, No. 1, 15–48, 20 figs. [Numerous refs.]

The author has investigated bionomics and histology of egg production in the autogenous and anautogenous races of *Culex pipiens*. He used 2

north German strains of anautogenous *Culex* and 1 autogenous strain from London and 2 from Germany. Rearing them on a standard diet at 23°C., he found consistent small differences in life cycle. The larval period of anautogenous strains averaged 10 days (9–13) while the autogenous forms took 2½ days longer (11–16). The autogenous females produced an egg batch about 6 days after emergence whereas the anautogenous ones demanded a blood meal and took only 4½ days after that. After the first egg batch the autogenous forms fell into the anautogenous cycle and produced their next batch 4½ days after a blood meal.

Certain anatomical differences were observed in the recently emerged females of the 2 forms. The abdomen of the anautogenous form was filled with fat and appeared distinctly larger. Histological comparisons of the ovarian development by phase contrast microscopes showed that the autogenous form was farther developed on emergence.

Autogenous egg batches are smaller (50–100) than anautogenous ones (150–400). This is related to a distinct difference in the number of follicles in the ovaries, the autogenous type possessing about 27 per cent. fewer. The autogenous forms were also smaller, since their wing length measurements averaged 5 to 13 per cent. less. These data are taken from strains reared together in the same bowl. It is not certain that they would apply to strains from very distant areas; North Africa, for example, or America.

Some comparative studies of ovarian development were made on other genera of culicidae. *J. R. Busvine*

Keller, J. C., Labrecque, G. C., Chapman, H. C. & Davis, A. N. **Seasonal Variations in susceptibility of Salt-Marsh Mosquito Larvae to Insecticides.** *Mosquito News.* 1956, Mar., v. 16, No. 1, 20–21.

Bidlingmayer, W. L. & Schoof, H. F. **Outdoor Residual Treatments of Premises for Control of Salt-Marsh Mosquitoes.** *Mosquito News.* 1956, Mar., v. 16, No. 1, 17–19.

"Residual treatments of DDT to the vegetation and lower portions of outbuildings within a radius of 100 feet from the house were superior to similar applications of dieldrin, lindane, and BHC in providing inhabitants with relief from daytime annoyance by salt-marsh mosquitoes in the Savannah, Georgia, area.

"Under moderate conditions of mosquito infestation, application of DDT at 5 and 10 pounds per acre produced effective reductions in mosquito densities for 4 to 6 and 9 weeks respectively. Under conditions of repeated heavy mosquito infestations, effective control with either dosage did not exceed 2 weeks. Protection afforded by treatments of dieldrin (1·0 to 4·0 lbs./acre), BHC (0·3 to 1·3 lbs. gamma isomer/acre), and lindane (0·5 lb./acre) ranged from 0 to 2 weeks."

Dobrotworsky, N. V. **The *Culex pipiens* Group in South-Eastern Australia. III. Autogeny in *Culex pipiens* Form *molestus*.** *Proc. Linnean Soc. of New South Wales.* 1954, v. 79, Pts. 5/6, 193–5, 1 fig. [13 refs.]

Williams, R. W. **A New Distribution Record for *Culex salinarius* Coq.: the Bermuda Islands.** *Mosquito News.* 1956, Mar., v. 16, No. 1, 29–30.

Komp, W. H. W. **Notes on *Haemagogus iridicolor* Dyar (Diptera, Culicidae).** Reprinted from *Proc. Entom. Soc. of Washington.* 1955, Feb., v. 57, No. 1, 29–31.

Levenbook, L. & Williams, C. M. **Mitochondria in the Flight Muscles of Insects. III. Mitochondrial Cytochrome *c* in relation to the Aging and Wing Beat Frequency of Flies.** *J. General Physiol.* 1956, Mar. 20, v. 39, No. 4, 497–512, 5 figs. [36 refs.]

Moreland, C. R. & McLeod, W. S. **House Fly Egg-Measuring Techniques.** *J. Econom. Entom.* 1956, Feb., v. 49, No. 1, 49–51, 1 fig. [16 refs.]

Three methods were tested of measuring the quantity of house-fly eggs. In the first, the eggs were transferred from the oviposition dish to a 15 ml. centrifuge tube containing tap water at room temperature. The tube was shaken, floating eggs and surplus water were removed and clean water was added. This procedure was repeated 3 times. For counting, the eggs were laid on green blotting paper in parallel lines. By this method the average number of eggs measuring 0·4 ml. after 20 counts was 2,750 with a standard deviation of ± 188.

The second method employed pieces of 5 ml. pipette tubes 6 cm. long. Cemented to one end of each pipette tube was a piece of 54-mesh bolting silk. The tubes were stood, open end up, in a cellulose sponge 4 cm. thick in a dish containing water 1 cm. deep. They were held upright by a piece of card pierced with holes of suitable size. Washed eggs were transferred from the centrifuge tube to the pipette tubes, and 20 counts of 0·3 ml. each averaged 2,687 eggs, SD ± 83.

A pit method was used in the third test but was dismissed from further consideration.

Both the centrifuge and the pipette methods were regarded as acceptable especially as there was no significant difference in the puparial yield. The centrifuge method is perhaps more suited to mass rearing because of ease of manipulation while the pipette method, being more accurate, is of value in special research. *H. S. Leeson*

Lichtwardt, Elizabeth T. **Genetics of DDT-Resistance of an Inbred Line of Houseflies.** *J. Heredity.* 1956, Jan.–Feb., v. 47, No. 1, 11–16, 1 fig. [16 refs.]

The resistant colony studied was developed from the same stock as that used by Maelzer and Kirk [see this *Bulletin*, 1954, v. 51, 320]. Before use it was inbred for 10 generations with no selection, except for fertility and hardiness. The laboratory susceptible strain was similarly inbred. Degrees of resistance to DDT were measured, in female house-flies only, by the mortalities resulting from a series of topical applications of DDT in acetone. The susceptible strain suffered 98 per cent. mortality at a dose which killed 20 per cent. of the original resistant colony; but none of the inbred resistant colony were killed by 10 times this dose.

Most of the crossing tests done were reciprocal mass matings and the similarity in results in opposite crosses ruled out cytoplasmic inheritance. In 3 series of tests, the F1 generation were all (over 98 per cent.) highly resistant. The F2 generations were tested over a range of concentrations which covered the different types of resistance. With small deviations the results of all series approximated to a 3:1 distribution of resistance. The back crosses of F1 hybrids with susceptible flies approximated to 1:1 ratio and the other back cross (to resistant flies) gave nearly all (over 98 per cent.) resistant progeny. These data indicate the presence of a single dominant gene for resistance. [This conclusion substantially agrees with the findings of Maelzer and Kirk. However Harrison, *ibid.*, 1951, v. 48, 930, and Milani, *ibid.*, 1955, v. 52, 1025, found evidence of a single *recessive* gene; while La Face, *ibid.*, 1952, v. 49, 1004, and D'Alessandro and Mariani, *ibid.*, 1954, v. 51, 1201, got results indicating multiple genes.] *J. R. Busvine*

Peffly, R. L. & Shawarby, A. A. **The Loss and Redevelopment of Insecticide Resistance in Egyptian House Flies.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 183–9. [12 refs.]

Resistance of *Musca domestica vicina* in Egypt to the chlorinated hydrocarbons used as insecticides became so marked that by 1952 their use for general house-fly control was no longer recommended by the Ministry of Health. In 1953, the level of susceptibility of house-flies to DDT, gamma BHC (lindane), pyrethrins, and parathion was measured for flies from 11 different localities in Egypt where use of chlorinated hydrocarbons had been discontinued for at least one fly season. Results were compared with those obtained with a laboratory strain isolated from insecticides since 1947. Tests of flies from different localities were made on wild-caught specimens, or on their F1 generation if few could be found. There was no material difference in the kill when original parents and the F1 generation were compared for susceptibility.

Flies taken from the different localities showed no serious degree of

resistance to any of the insecticides: LD50 values, expressed as μgm. per fly, fell within the following ranges, it being notable that the lowest value is not always for the laboratory colony or for flies from two villages, Ashtar and Barada, in which insecticides are believed not to have been used in the past: *DDT*—1·0 (lab. strain) to 2·7 (Abbassia dump aerially sprayed, 1947); *gamma BHC*—0·06 (Aghour el Sughra sprayed with DDT, gamma BHC, and chlordane 1948 to 1951) to 0·46 (Sindbis, sprayed over the same years with the same insecticides but more frequently); *pyrethrins* —0·36 (Aghour el Sughra, as above) to 1·5 (Heliopolis slaughterhouse, sprayed once with gamma BHC, 1949); and *parathion*—0·009 (lab. strain) to 0·017 (Moneeb, sprayed with DDT and chlordane in 1949 and 1950). (A greater resistance to insecticides generally of Egyptian house-flies compared with strains reported upon from different parts of the United States may perhaps be a matter of technique.)

Thus, although serious resistance to insecticides was reported in Egyptian house-flies earlier, this had largely been lost by 1953. Reversion to susceptibility in the absence of insecticide contact is known in some laboratory strains of house-fly.

In Konayesa gamma BHC and chlordane had been used lavishly from 1949 to 1952. In 1953 the LD50 for gamma BHC was 0·19. A field trial to test the persistence of this level of susceptibility after renewal weekly of BHC dusting of potential breeding places, as carried out in the earlier years, failed to control the flies; and in 7 weeks' time the LD50 had increased at least three-fold. This treatment, which was effective in 1949 and 1950, failed in 1953. It is concluded that recovery of susceptibility to chlorinated hydrocarbons is rapidly lost if their use is resumed and that organic phosphoric compounds of low mammalian toxicity (malathion and others) should be investigated as residual sprays or poison for baits. This group of compounds is not so far associated with the development of resistance of practical significance.

D. S. Bertram

See also p. 1038, Grenier *et al.*, Simuliidae d'Afrique Occidentale française (Haute-Volta, Dahomey, Soudan français, Senégal, Côte d'Ivoire) [**Species of *Simulium* of French West Africa**]

Lewis, D. J. **Nimitti and some other Small Annoying Flies in the Sudan.** Reprinted from *Sudan Notes & Records*. 1954, v. 35, Pt. 2, 76–89. [13 refs.]

"Nimitti" is a name applied to various small flies bothering man, and his animals, in the Sudan. *Tanytarsus lewisi* is a minute non-biting midge abundant in Khartoum and Wadi Halfa seasonally, usually December to April in Khartoum and March and April at Wadi Halfa. The midge breeds in the mud and sand on the bed of the Nile. Adults emerge in vast numbers and are particularly active after dark, when they

are attracted to lights. They interfere seriously with work and relaxation both outdoors and indoors; all but navigation lights on river-craft have to be put out to enable the helmsman to see his course; the corpses of the midges spoil any newly painted wet surface. Coryza, asthma and other allergic conditions are attributed to these flies and their powdered remnants. Antilarval and anti-adult measures seem likely to be prohibitively costly or not sufficiently effective. Personal protection by use of red lights in houses, or fluorescent lighting at a point 10 metres from where people intend to sit outdoors in the evening, and allowance for wind movement through garden hedges, are simple expedients which reduce or localize the fly nuisance. These chironomids appear to have become a pest in Khartoum only after the completion of the Sennar dam. Changes in the flow of the Nile may have favoured breeding, and the development of trees and gardens provided shelter for emerged adults.

Immense numbers of a fly *Oscinella aharonii* sometimes have a nuisance effect in shady gardens and other places in residential parts of Khartoum and the Gezira area. It rarely enters the human eye and is not considered to be concerned in any way with conjunctivitis. Domestic use of a pyrethrum spray is all that seems justifiable in control.

The rest of the article is mainly concerned with popular accounts of *Simulium damnosum* and *S. griseicolle* (the true nimitti) [see this *Bulletin*, 1954, v. 51, 743].

There are some historical notes on travellers' experiences with pests of small flies. *D. S. Bertram*

Burnett, G. F. & Woodcock, K. E. **The Choice of Nozzles for spraying Buildings with Residual Insecticides.** *East African Med. J.* 1956, Feb., v. 33, No. 2, 54–64, 3 figs.

The choice of a suitable nozzle is of great importance in the economical spraying of buildings with residual insecticides. Tests were made with 3 types of liquid-pressure nozzles in use in East Africa, including a hollow cone type (maker's number size 4), a narrow fan type (size 3) and a ceramic " gas " type (size 1).

Tests were made in a 4 ft. long box lined with absorbent newspaper, one movable end representing the target. To avoid splashing and run-off spraying was done for a fraction of a second and both the liquid which hit the target and that which fell out were collected and measured separately. The test solution consisted of " Waxoline red " dye in power kerosene and the estimation was done by extracting in Soxhlet apparatus and matching the resulting dye solutions against standards in a Spekker absorptionmeter.

The results indicate that for general efficiency and evenness of application a fan nozzle of angle about 60° (measured at a pressure of 30 per square inch [p.s.i.]) is the nozzle of choice. In the concluding remarks the authors infer that for whatever type of nozzle, the size should be the

largest that allows spraying to be carried out in a controlled manner, particularly when roofs and ceilings are involved. With the narrow-fan type of nozzle, increased pressure leads to greater efficiency but the greater flow rate may be embarrassing, in which case it is probably better to reduce pressure than to use a smaller jet. With hollow-cone and wide-angled fans a pressure of 30 p.s.i. is much to be preferred to a higher one. The spray distance must not exceed 12 inches when oil is used, but water sprays are likely to carry rather better. All these recommendations here agree closely with the official WHO specification. *W. Z. Coker*

Chemical Specialties Manufacturers Ass. **The Peet-Grady Method. Official Method of the Chemical Specialties Manufacturers Association for evaluating Liquid Household Insecticides,** Latest Revision. *Soap.* New York. 1956 (Blue Book), 243–4, 267.

———————————. **Aerosol Insecticides Storage Test. Tentative Official Method of the Chemical Specialties Manufacturers Association for Storage of Aerosol Insecticides.** *Ibid.* 245–6.

———————————. **Aerosol Test Method for Flying Insects. Official Method of the Chemical Specialties Manufacturers Association for assaying Aerosols for Flying Insects.** *Ibid.* 247–8, 266–7. [10 refs.]

———————————. **Cockroach Aerosol Test Method. Tentative Method of the Chemical Specialties Manufacturers Association for evaluating Aerosol Cock Roach Insecticides.** *Ibid.* 251–2, 265–6, 1 fig. [11 refs.]

———————————. **Cockroach Spray Test Method. Official Method of the Chemical Specialties Manufacturers Association for evaluating Cockroach Sprays.** *Ibid.* 249–50.

Walton, B. C., Traub, R. & Newson, H. D. **Efficacy of the Clothing Impregnants M-2065 and M-2066 against Terrestrial Leeches in North Borneo.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 190–96.

Three preparations were tested for their value in preventing attachment of leeches to persons under bush and jungle conditions in North Borneo. The principal leeches concerned were *Haemadipsa picta* which

climbs bushes, if moist, and attaches from any height, and *H. zeylanica subagilis* which attaches below knee level. One of the preparations was M-1960, the standard repellent for American service use and consisting of: N-butylacetanilide, 30 per cent.; 2-butyl-2-ethyl-1,3-propanediol, 30 per cent.; benzyl benzoate, 30 per cent.; "Tween 80" (emulsifier), 10 per cent. M-2065 consisted of 29 per cent. of undecylenic acid, of N-propylacetanilide, and of N-butyl-4-cyclohexene-1,2-carboximide, with 3 per cent. of lindane, and 10 per cent. of the emulsifier "Tween 80". M-2066 was identical except that there was 1 per cent. only of lindane and slightly more accordingly of the first 3 components.

All test garments were washed 4 times before use to limit possible toxic effects on the wearers. Besides testing with full-length trousers, tunics and shorts, some observations were made on the value of treated socks only for the lightly clad indigenous people.

All 3 preparations gave excellent results. Even after 4 further soap and water washings M-1960 and M-2065 were still effective, but less efficient. Leeches which had got on to these garments had often not become attached and had not fed. Untreated uniforms also gave some protection of this sort. Treated socks on scantily clad indigenous persons gave excellent protection. That protection was given against the bush-climbing leech is thought to be due to the fact that the dryness of the weather during the tests tended to confine the leeches to ground level.

It is not known which of the components of the preparations deterred the leeches but work by others has shown that benzyl benzoate, aldrin, dieldrin and lindane have litttle effect against them. [For previous studies with M-1960, see Audy and Harrison, this *Bulletin*, 1954, v. 51, 1204.] *D. S. Bertram*

MISCELLANEOUS PAPERS

Demarchi, J. Le milieu biologique en région tropicale. [**The Biological Environment in Tropical Regions**] *Méd. Trop.* Marseilles. 1956. Jan.–Feb., v. 16, No. 1, 59–74. [40 refs.]

Man, the most successful of species, has adapted himself with varying success to surroundings which are most diverse though his own constitution shows little difference from place to place. The influence of surroundings is described by reference to the delta of Tonkin and the Ivory Coast; it is concluded that the Hippocratic concept of the role of airs, waters and places in epidemiology is still valid and can be explained in terms of the aetiological influence, though this explanation does not overrule the importance of prime causes. Environment can be analysed

in terms of the place, climate, animals and vegetation, nutrition and social customs. Each of these is broken down into a number of subsidiary factors; the place into ground, water and relief; the climate into temperature, humidity, rain, drought, winds, electric charge and natural radiation, and so on. The ways in which each of these may influence man to his advantage or detriment are then reviewed. To oppose or take advantage of his environment man has a hereditary constitution which does not differ much from place to place, though there may be minor differences of considerable importance, and an acquired ability to combat some of the special perils with which he may come into contact. The doctor who follows the Hippocratic concept and studies these factors will practise the art of medicine with success. *G. Macdonald*

Chesterman, C. C. **Facilities for the training of Doctors and Medical Auxiliaries in Tropical Africa.** *Central African J. of Med.* 1956, Jan., v. 2, No. 1, 15–21.

The author points out that although facilities for training African graduates in medicine are increasing in nearly all territories, medical auxiliaries will still be required for a considerable period of time. He gives a useful summary of the facilities for graduate training already in existence and of the varying titles assigned to medical auxiliaries in different countries. He makes a plea for more uniformity in nomenclature, status and conditions of service.

[This article should be consulted by all interested in African medical education. Much of the ground has been covered by the author in a previous paper, which was fully abstracted in this *Bulletin*, 1954, v. 51, 123.] *Frederick J. Wright*

REPORTS AND SURVEYS

Maire, A. & Savelli, A. In Salah et le Tidikelt oriental. Étude historique, géographique et médicale. [**In Salah and Eastern Tidikelt. Historical, Geographical and Medical Study**] *Arch. Inst. Pasteur d'Algérie.* 1955, Dec., v. 33, No. 4, 367–435, 6 text figs. & 29 figs. on 12 pls. [41 refs.]

It is more than 30 years since the Archives of the Pasteur Institute of Algeria published its first historical, geographical and medical survey of an Algerian Sahara *Annexe* and periodically since then these studies have been an interesting feature of that journal. Together they constitute an eloquent tribute to the humanitarian work, more especially in the

medico-social field, carried out by the French administration during the 50-odd years that the territory has been under the French flag. Peace and security have been brought to populations which up to the close of last century were exposed to brigandage and the slave trade. In spite of change the people still live a simple life and retain ancient customs, prejudices and superstitions.

This latest study closely follows its predecessors in form and content. In Salah is the administrative centre of Tidikelt, a vast desert region in the heart of the Sahara covering 100,000 square kilometres, 1,300 kilometres south of Algiers. The palm grove of In Salah extends 6 kilometres from north to south and has an average width of 500 metres and comprises some 90,000 trees. In Salah, together with its satellite oases, has a population of 9,500 of which 2,500 are nomads. The white and black elements of the population are about equal, the white composed of pure Arab or Arab-Berber mixed stock, the black, Haratin and Negroes. Their manners, customs, beliefs, superstitions, occupation etc. are well described.

Up to 1949 a single medical officer was responsible for all medical and health activity of Tidikelt. In that year the growing importance of Aoulef, more especially of its aerodrome, the most important in the Sahara, necessitated the appointment of a second medical officer. The medical officer resident in Aoulef is responsible for all health activities in Western Tidikelt, the other, resident in In Salah, is responsible for Eastern Tidikelt.

A new hospital was built in In Salah in 1954, a modern construction in stone. It contains an out-patient department, operating block, dental room, simple laboratory, pharmacy, and small hospital wards. It is lit by electricity and has X-ray equipment. In 1954 out-patient attendances numbered 60,000 and hospital admissions exceeded 300. There are 7 outposts in Eastern Tidikelt for the treatment of trachoma. The control of trachoma and epidemic conjunctivitis, smallpox vaccination and malaria control are the chief health preoccupations of the medical officer. Maternal and infant welfare, medical supervision of schools and school-children, medical supervision of prostitutes, food inspection and general sanitation all come within his purview.

Disease prevalence resembles closely that described in previous reports of this series concerning adjacent oases, those of Touat and Gourara in particular [this *Bulletin*, 1954, v. 51, 441]. Malaria prevalence is very low. The spleen rate of children aged 1 to 15 was only 3·3 in 1954, and the parasite rate 1·2 per cent.

No typhus fever has been reported from Tidikelt, even during the epidemic prevalence of that disease throughout North Africa in 1941–44. There were, however, 19 cases of louse-borne relapsing fever reported in 1946. Only one case of oriental sore has been reported. Small outbreaks of mumps and whooping cough have occurred in recent years. In 1943 diphtheria caused 13 deaths. Fevers of the typhoid group are very rare.

No Malta fever has ever been observed. No smallpox has been seen since 1920. Chicken-pox and measles both occur.

Tuberculosis is prevalent. In 1955 the Mantoux reaction was positive in 46·2 per cent. of 3,944 persons tested. The remainder were vaccinated. Trachoma is by far the greatest scourge: the majority of children are infected.

Food consumed seems meagre in both quality and quantity but deficiency diseases have been little in evidence in recent years.

Ascaris lumbricoides infects a very large proportion of the population.

In spite of all the vast improvements effected in the lot of the people during recent years the material conditions of existence remain exceptionally difficult in one of the most implacable climates in the world.

Norman White

BOOK REVIEWS

Jepps, Margaret W. **The Protozoa, Sarcodina.** pp. vii + 183, frontispiece & 80 figs. 1956. Edinburgh: Oliver & Boyd, Ltd., Tweeddale Court. London: 39A, Welbeck Street, W.1. [30s.]

This book is based on courses of lectures given by the author to senior students of zoology at the University of Glasgow. However, it is not meant to serve as a textbook or practical guide, nor is it a monograph, but rather an essay on the class Sarcodina (or Rhizopoda), " intended to encourage . . . reading in the original sources " and to provide " a starting-off place for further study in any branch of the subject which arouses particular interest ".

A general survey of the structure, bionomics and systematics of the Protozoa, is followed by outlines of the morphology and life cycles of representative forms in the 7 orders of the Sarcodina (Amoebaea, Foraminifera, Heliozoa, Radiolaria, Rhizomastigina, Protomyxidia and Mycetozoa), illustrated by well-chosen figures.

Within the limited compass of this work the author has managed to convey a clear picture of the present state of knowledge of the Rhizopods, while her vivid treatment of the subject cannot fail to stimulate students and teachers of zoology, whose interests the author has in mind. As the parasitic amoebae of man are necessarily dealt with very briefly, their description will not satisfy medical readers whose interest in protozoology does not go beyond the practical needs of tropical medicine. But this book can be recommended to those who would see the familiar amoebae in true perspective, against the background of the Rhizopoda as a whole.

In accordance with the plan outlined in the preface, the book is

supplied with a well selected bibliography. Since Reichenow's revision of Doflein's classical *Lehrbuch der Protozoenkunde* is specially recommended, it is surprising to find the reference to the 5th (1929), instead of the more recent 6th (1952), edition of this treatise [this *Bulletin*, 1953, v. 50, 1109]. *C. A. Hoare*

Jelliffe, D. B. [M.D., M.R.C.P., D.C.H., D.T.M. & H.] **Infant Nutrition in the Subtropics and Tropics.** *World Health Organization Monograph Series No. 29.* 237 pp., 1 diagram, 24 figs. & 2 coloured pls. 1955. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [25s.; $5.00; Sw. fr. 15.–.].

Few will disagree with the author's introductory statement that " Millions of children in the subtropical and tropical technically underdeveloped areas of the world are suffering from malnutrition as a result of poverty, lack of suitable food, ignorance, and superstition ". With this in mind the World Health Organization initiated a study carried out by Dr. Jelliffe, of which this volume is the report.

Many countries in the Middle and Far East were visited and the report is based on observations made in maternal and child health centres in these countries, on discussions with staff of such centres and with paediatricians, nurses and administrators. An interesting historical review of the evolution of infant feeding in the Western World is followed by a description of present infant feeding practices in the subtropics and tropics. In the latter, emphasis is placed on the part that ignorance and taboos play as a cause of malnutrition as these are probably more important than poverty as causes of malnutrition in the tropics. Thus eggs, it is stated, " are surprisingly little used for infant feeding, and a great number of quite different taboos and superstitions have grown up about their use in different countries ". Another dangerous practice commented upon is " a tendency to keep the infant on a single, monotonous, predominantly carbohydrate food for meal after meal, instead of attempting to broaden the diet to include other foods, which may quite often be available ". The main forms of nutritional disease among infants in the subtropics and tropics are then briefly described, methods of improving infant feeding and preventing kwashiorkor are discussed and there is a concluding chapter on nutrition education and maternal and child health centres.

The material is admirably presented and the various subjects treated have clearly been studied—and are here reported on—with thoroughness and attention to detail. The arguments are carefully thought out and the conclusions will command respect. Emphasis is rightly placed on the necessity for health education in the prevention of nutritional disease for as Cicely Williams has stated " it is very often found that malnutrition is due not to economic poverty but to poverty in knowledge of the

nutritional needs of a child, to defective personal and domestic hygiene, and to fatalism which produces poverty of imagination ". Consideration is given to the development from locally produced, readily available cereals of foods rich in protein suitable for infants. Attention is also drawn to the necessity for studying local conditions and variations in food habits before instituting any maternal and child health programme in a given region.

This is a book which can be strongly recommended to all concerned with the treatment and prevention of malnutrition in the tropics and subtropics. *A. W. Woodruff*

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